FIRESAFE

INSTALLATION INSTRUCTIONS

FIRESAFE GPG MORTAR

Fire stopping System:
Fire resistant mortar for all types of installation penetrations in flexible and rigid walls, and rigid floor.

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FIRESAFE
GPG MORTAR

ETA 15/0026
DoP.: FIR/PP/GPG-25-05-2015 - WM 15/0026

Product documentation:
Norway: RISEFR AA-050
RISE Fire Research AS

Tested in accordance with NS-EN 1366-3:2009 and NS-EN 1366-4:2006 + AL: 2010.

Innhold

General description

FIRESAFE GPG MORTAR
GPG is a powder consisting of gypsum, perlite and fibreglass that when mixed with water forms a white fire resistant mortar of a fluid or firm consistency. GPG is a gypsum-based fast-curing fire resistant mortar with high mechanical strength and good sound insulation properties. Even in small thicknesses, GPG provides good thermal conductivity around all technical installations and insulates against heat. GPG increases in volume as it cures and has excellent adhesion to all building materials. GPG is mainly used as a fire sealant for large or small penetrations around technical installations as well as apertures in walls, brick/concrete slabs and roofs or plasterboard structures with fire resistance up to EI 240 minutes with the thicknesses specified in the product documentation.

The product's field of application is category Z2: indoors with humidity less than 85% RH, temperature not below 0 °C, protected from rain and UV radiation.

INSTALLATION
GPG is added to a bucket filled with a little water in the bottom. The mortar is mixed with a trowel or mixed for about ½ minute with a drill to achieve a smooth mixture at the desired consistency. Initial curing time is 75 minutes in line with NS-EN 480-2, but may vary depending on the mixing ratio between water and GPG. FS retarder may be added to delay the curing time. A firm mixture is made with 4 parts GPG and 1 part water. A fluid mixture is made with 2 parts GPG and 1 part water.

Apertures must be cleaned of dust and dirt before applying the fire sealant. Metal pipes must always be rust proofed before applying the fire sealant. Masking tape should be used around apertures for a nice final result.

GPG mortar is applied according to the tables for the relevant fire resistance, construction and equipment listed in these installation instructions.

For fire sealing concrete hollow core slabs, the procedure is specified in SINTEF Building Detail 520.342 – October 2014, section 25.

Alternatively, the penetration can be sealed on the top and the underside of the rigid floor. The flanges on the rigid floor must then be of at least the same thickness as the fire sealant in order to achieve the required fire resistance.

CORROSION PROTECTION
For all fire sealing around uninsulated metal pipe, it is important to ensure that the pipes have sufficient corrosion resistance for the particular environment in which they are installed. This is because moisture/condensation can easily occur at and around a fire seal. A plumber is usually responsible for the corrosion protection.

SAFETY FACTORS
Firesafe GPG complies with GEV requirements and the result corresponds with EMICODE class EC 1PLUS. The product also complies with the requirements of the M1 classification, based on ISO 16000. There are no health risks or safety issues.

STORAGE
Store dry and frost-free. The shelf life of the product is virtually unlimited.

TECHNICAL INFORMATION
For other technical information, see the Product Data Sheet for FIRESAFE GPG MORTAR.

DELIVERY FORM
GPG comes in 25 or 15 litre bags, and 20, 10 or 5 litre plastic tubs.

25 litre bag
FS article No: 100 050
EI-number: 12 178 00

15 litre bag
FS article No: 100 100
EI-number: 12 178 60

10 litre bag
FS article No: 100 017
EI-number: 12 178 48

5 litre bag
FS article No: 100 101
EI-number: 12 178 59

Cable penetrations

FIRE CLASSIFICATION AND CABLE TYPES
Fire classification for cables applies to all types of cables in Europe with maximum diameter specified in the tables, and all kinds of cable sheathing/insulation.

Fire classification for slabs also applies for use in roofs. All types of continuous cable trays/cable ladders are made of steel and bundles in the same penetration. All tables with cable trays and cable ladders also apply to penetrations without cable trays and cable ladders, but not vice versa.

Fire classification for cable trays does not apply to cable trays with covers.

There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other.

The penetrations may contain cable bundles Ø ≤ 100 mm of all types of small cables or telecommunication cables with a diameter less than or equal Ø ≤ 21 mm. For these cable bundles, Firesafe EX intumescent sealant must be used in the GPG seal from both sides.

Multiple penetrations shall not exceed more than 60% of the area of aperture. (Multiple means more than one installation in the same aperture.)

Single cables or cable bundles should have a minimum of 30 mm of clearance within the aperture for GPG sealant on one or all sides.

The fire sealant can be applied with and without stone wool insulation assuming compliance with described GPG sealant thicknesses.

Use of stone wool insulation depends on the thickness of the concrete slab and requirements for GPG thickness in the tables.

Tables for aluminium cables only apply for aluminium cables.

/ For fire resistance class and installation details, see tables:

Table	Type of penetration	Figure	Fire resistance class	Page
1	Rigid floor ≥ 150 mm. Large cable penetrations. All types of cables with and without cable ladder/cable tray. FS EX.	1-2	E 120 / EI 120	**6**
2	Rigid floor ≥ 150 mm. Small cable penetrations. Large cable bundle without cable ladder/cable tray. FS EX.	3-4	E 120 / EI 120	**7**
3	Rigid floor ≥ 150 mm. Small cable penetrations. Small cable bundle without cable ladder/cable tray.	5	E 120 / EI 120	**8**
4	Rigid floor ≥ 150 mm. Large cable penetrations. All types of cables without cable ladder/cable tray. FS EX.	6	E 120 / EI 90	**8**
5	Rigid floor ≥ 150 mm. Large cable penetrations. All types of aluminium cables without cable ladder/cable tray.	7	E 120 / EI 120	**9**
6	Rigid floor ≥ 150 mm. Large cable penetrations. All types of aluminium cables with and without cable ladder/cable tray.	8	E 90 / EI 90	**9**
7	Rigid wall ≥ 100 mm. Small cable penetrations. Stor kabelbunt without cable ladder/cable tray. FS EX.	9	E 90 / EI 90	**10**
8	Rigid wall ≥ 100 mm. Large cable penetrations. All types of cables with and without cable ladder/cable tray. FS EX.	10	E 90 / EI 60	**10**
9	Rigid wall ≥ 100 mm. Large cable penetrations. All types of cables without cable ladder/cable tray.	11 A -11 B	E 90 / EI 60	**11**
10	Flexible and Rigid wall ≥ 100 mm. Small cable penetrations. All types of cables without cable ladder/cable tray. FS EX.	12 A - 12 F	E 120 / EI 120	**12-13**
11	Flexible and Rigid wall ≥ 100 mm. Large cable penetrations. All types of cables with and without cable ladder/cable tray. FS EX.	13	E 120 / EI 90	**14**
12	Flexible and Rigid wall ≥ 100 mm. Large cable penetrations. All types of cables without cable ladder/cable tray. FS EX.	14	E 120 / EI 60	**14**
13	Flexible and Rigid wall ≥ 100 mm. Large cable penetrations. All types of aluminium cables with and without cable ladder/cable tray.	15-16	E 90 / EI 60	**15**
14	Flexible and Rigid wall ≥ 100 mm. Rigid floor ≥ 150 mm. Plastic electrical cable conduits d ≤ Ø 32 mm.	17-18	E 120 / EI 120	**16**

Rigid floor ≥ 150 mm

Table: 1

Fire resistance class E 120 / EI 120					
Rigid floor ≥ 150 mm. Large cable penetrations ≤ 700 x 700 mm. Table for all cables with all types of cable sheathing/insulation					
Cable type	**Diameter (d) mm**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Additional product**	**Figure**
All types of cables	d ≤ Ø 80 mm	With and without	GPG 200		**1 and 2**
Cable bundle small cables d ≤ Ø 21 mm	d ≤ Ø 100 mm	With and without	GPG 200	*FS EX	
Cable bundle (F) Telecom d ≤ Ø 21 mm	d ≤ Ø 100 mm	With and without	GPG 200	*FS EX	

Installation

There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other or in a bundle, as shown below.

GPG sealant must be a thickness of 200 mm. In thinner rigid floors ≤ 200 mm, an additional sealant must be cast on the top of the floor with 50 mm GPG.

For rigid floors thicker than 250 mm, the aperture is insulated with 50 mm of stone wool, density 100 kg/m3, as shown in **figure 2.**

GPG is mixed to a fluid consistency with 2 parts GPG and 1 part water.

Figure 1. Rigid floor 150 mm. Thickness of GPG 200 mm

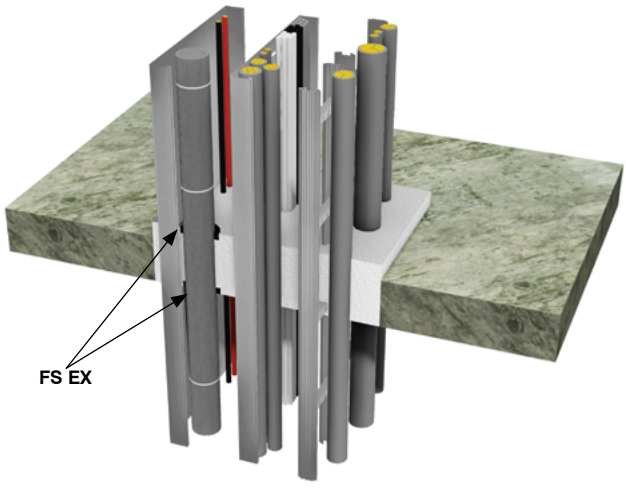
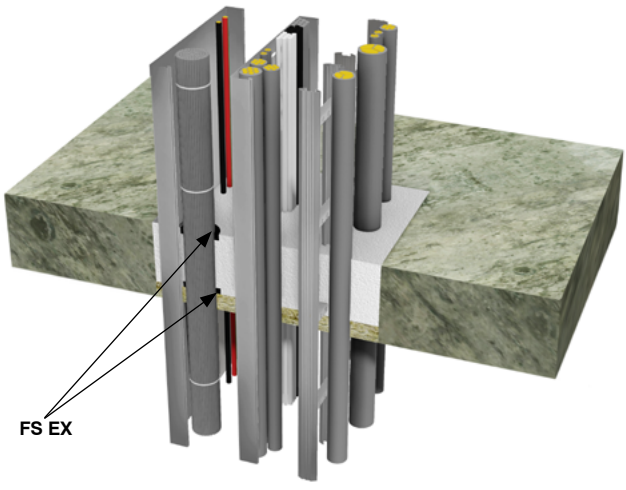


Figure 2. Rigid floor 250 mm. Thickness of GPG 200 mm and 50 mm stone wool



* For all types of cable bundles listed in the table above, Firesafe EX - intumescent sealant must be applied in the GPG mortar from both sides of the floor. Width 15 mm x depth 20 mm.

Rigid floor ≥ 150 mm

Table: 2

Fire resistance class E 120 / EI 120					
Rigid floor ≥ 150 mm. Small cable penetrations ≤ 270 x 270 mm or ≤ Ø 300 mm. Large cable bundle with all types of cable sheathing/insulation					
Cable type / bundle	**Diameter bundle (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Additional product**	**Figure**
All types of cables d ≤ Ø 80 mm	d ≤ Ø 195 mm	Without	GPG 200	*FS EX	**3 and 4**

Installation

There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other or in a bundle, as shown below.

GPG sealant must be a thickness of 200 mm. In thinner rigid floors ≤ 200 mm, an additional sealant must be cast on the top of the floor with 50 mm GPG.

For rigid floors thicker than 250 mm, the aperture is insulated with 50 mm of stone wool, density 100 kg/m3, as shown in **figure 4**.

GPG is mixed to a fluid consistency with 2 parts GPG and 1 part water.

Figure 3. Rigid floor 150 mm. Thickness of GPG 200 mm

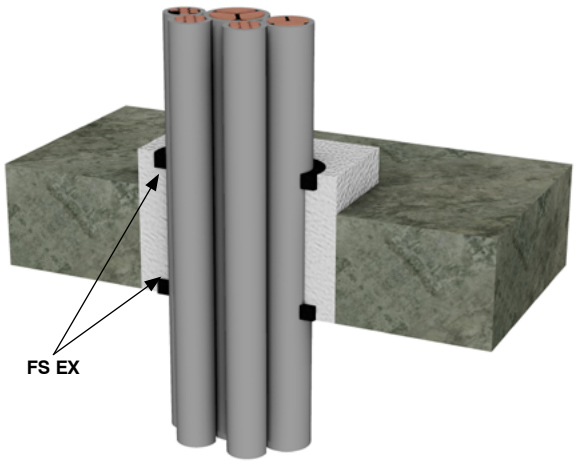
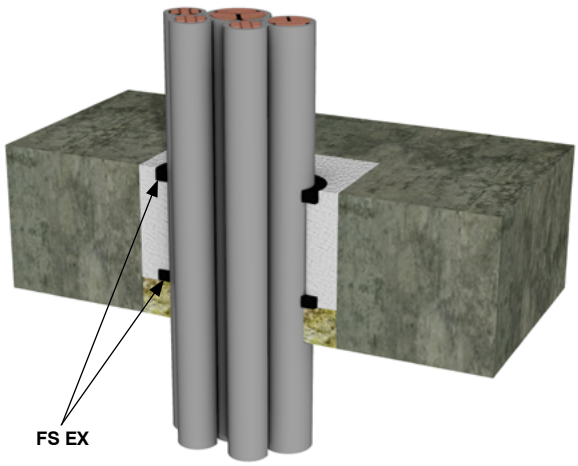


Figure 4. Rigid floor 250 mm. Thickness of GPG 200 mm and 50 mm stone wool



* For all types of cable bundles listed in the table above, Firesafe EX - intumescent sealant must be applied in the GPG mortar from both sides of the floor. Width 15 mm x depth 20 mm.

Rigid floor ≥ 150 mm

Table: 3

Fire resistance class E 120 / EI 120					
Rigid floor ≥ 150 mm. Small cable penetrations ≤ 270 x 270 mm or ≤ Ø300 mm. Small cable bundle with all types of cable sheathing/insulation					
Cable type / bundle	**Diameter bundle (d)**	**Cable ladder or cable tray**	**Stone wool 150 kg/m3**	**Thickness of GPG (mm)**	**Figure**
Cable bundle small cables d ≤ Ø 21 mm	d ≤ Ø 60 mm	Without	Stone wool, 50 mm	GPG 100	**5**

Table: 4

Fire resistance class E 120 / EI 90					
Rigid floor ≥ 150 mm. Large cable penetrations ≤ 700 x 700 mm. Tabell for alle typer kabler og alle typer kabelmantel / isolasjon på kablene					
Cable type	**Diameter (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Additional product**	**Figure**
All types of cables	d ≤ Ø 80 mm	Without	GPG 150		**6**
Cable bundle small cables d ≤ Ø 21 mm	d ≤ Ø 100 mm	Without	GPG 150	*FS EX	
Cable bundle (F) Telecom d ≤ Ø 21 mm	d ≤ Ø 100 mm	Without	GPG 150	*FS EX	
All types of earth cables	d ≤ Ø 24 mm	Without	GPG 150		

Installation

There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other or in a bundle, as shown below.

GPG sealant must be a thickness of 150 mm. In thinner rigid floors ≤ 200 mm, an additional sealant must be cast on the top of the floor with 50 mm GPG.

For rigid floors thicker than 200 mm, the aperture is insulated with 50 mm of stone wool, density 100 kg/m^3.

Then, GPG is mixed to a fluid consistency using 2 parts GPG and 1 part water.

Figure 5. Cable bundle d ≤ Ø 60 mm consisting of all cable types with d ≤ Ø 21 mm except telecom cables.

Figure 5. Thickness of GPG 100 mm

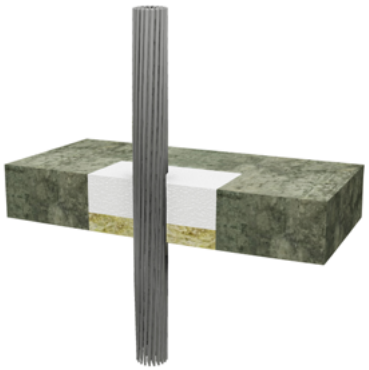
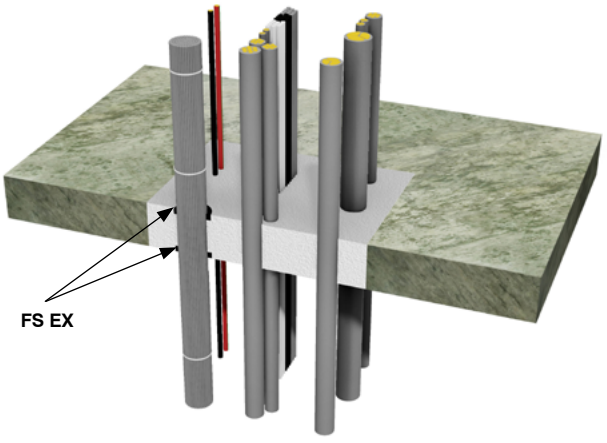


Figure 6. Thickness of GPG 150 mm



* Firesafe EX - intumescent sealant is applied around the cable bundle on both sides of the floor. Width 15 mm x depth 20 mm.

Rigid floor ≥ 150 mm

Table: 5

Fire resistance class E 120 / EI 120					
Rigid floor ≥ 150 mm. Large cable penetrations ≤ 600 x 600 mm					
Cable type	**Diameter (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Stone wool 150 kg/m3**	**Figure**
All types of aluminium cables	28 ≤ d ≤ 50 mm	Without	GPG 100	Stone wool, 50 mm	**7**

Table: 6

Fire resistance class E 90 / EI 90					
Rigid floor ≥ 150 mm. Large cable penetrations ≤ 1800 x 900 mm					
Cable type	**Diameter (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Stone wool 150 kg/m3**	**Figure**
All types of aluminium cables	28 ≤ d ≤ 50 mm	With and without	GPG 100	Stone wool, 50 mm	**8**

Installation

There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other or in a bundle, as shown below.

GPG sealant must be a thickness of 100 mm. The aperture is insulated with 50 mm stone wool, density 150 kg/m^3.

Then, GPG is mixed to a fluid consistency using 2 parts GPG and 1 part water.

Figure 7. Thickness of GPG 100 mm and 50 mm stone wool

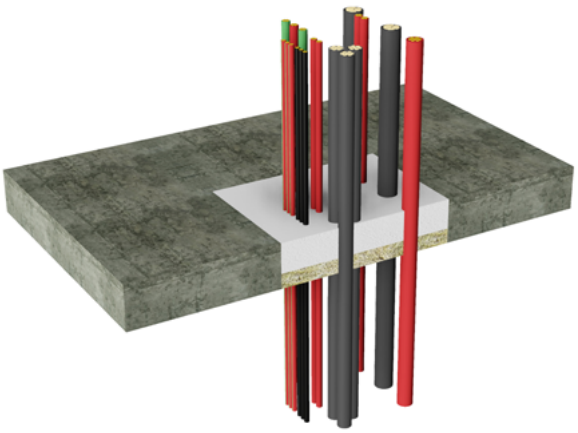
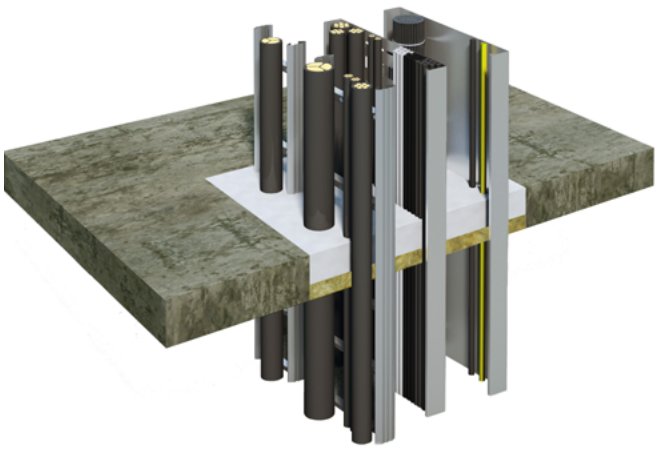


Figure 8. Thickness of GPG 100 mm and 50 mm stone wool



Rigid wall ≥ 100 mm

Table: 7

Fire resistance class E 90 / EI 90					
Rigid wall ≥ 100 mm. Small cable penetrations ≤ 270 x 270 mm eller ≤ Ø300 mm. Large cable bundle with all types of cable sheathing/insulation					
Cable type / bundle	**Diameter bundle (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Additional product**	**Figure**
Cable bundle large cables d ≤ 80 mm	d ≤ Ø 195 mm	Without	GPG 100	*FS EX	**9**

Table: 8

Fire resistance class E 90 / EI 60					
Rigid wall ≥ 100 mm. Large cable penetrations ≤ 700 x 700 mm. Table for all cables with all types of cable sheathing/insulation					
Cable type	**Diameter (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Additional product**	**Figure**
All types of cables	d ≤ Ø 80 mm	With and without	GPG 100		**10**
Cable bundle small cables d ≤ 21 mm	d ≤ Ø 100 mm	With and without	GPG 100	*FS EX	
Cable bundle (F) Telecom d ≤ 21 mm	d ≤ Ø 100 mm	With and without	GPG 100	*FS EX	
All types of earth cables	d ≤ Ø 24 mm	With and without	GPG 100		

Installation

There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other or in a bundle, as shown below.

GPG sealant must be a thickness of 100 mm.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water.

Figure 9. Thickness of GPG 100 mm

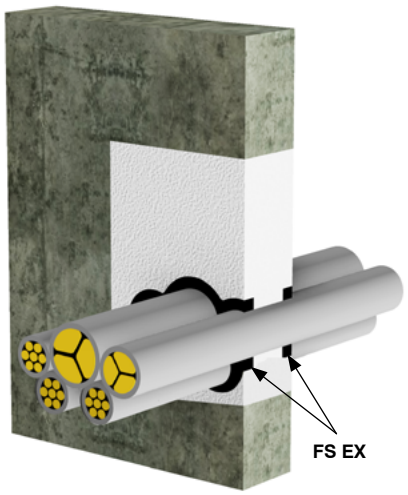
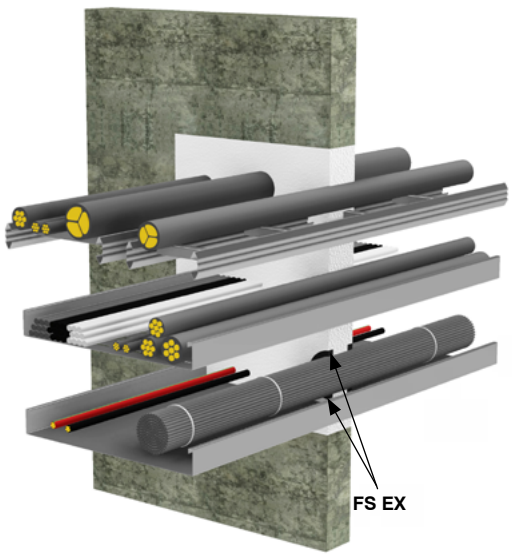


Figure 10. Thickness of GPG 100 mm



* For all types of cable bundles listed in the table above, Firesafe EX - intumescent sealant must be applied in the GPG mortar from both sides of the wall. Width 15 mm x depth 20 mm.

Rigid wall ≥ 100 mm

Table: 9

Fire resistance class E 90 / EI 60				
Rigid wall ≥ 100 mm. Large cable penetrations ≤ 700 x 700 mm. Table for all cables with all types of cable sheathing/insulation				
Cable type	**Diameter (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Figure**
All types of cables	d ≤ Ø 50 mm	Without	GPG 60	**11 A and 11 B**

Installation

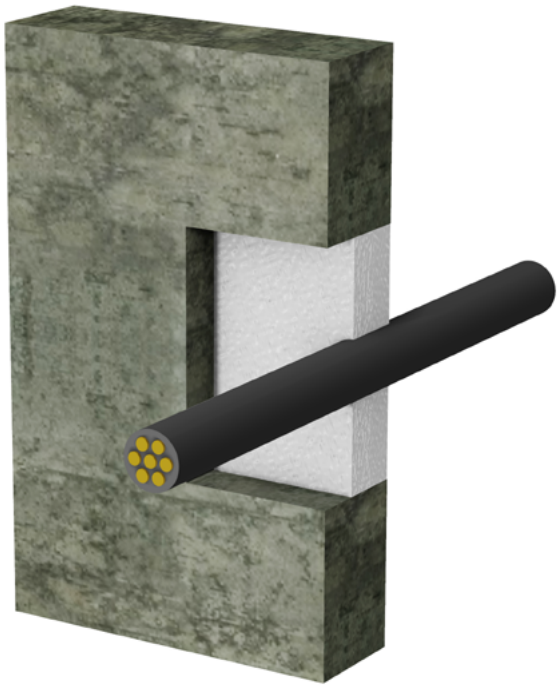
There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other or in a bundle, as shown below.

GPG sealant must be a thickness of 60 mm.

GPG compound is mixed to a firm consistency with 4 parts GPG and 1 part water.

Figure 11 A. Thickness of GPG 60 mm

Figure 11 B. Thickness of GPG 60 mm



Flexible and Rigid wall ≥ 100 mm

Table: 10

Fire resistance class E 120 / EI 120					
Flexible and Rigid wall ≥ 100 mm. Small cable penetrations ≤ 265 x 265 mm or ≤ Ø300 mm. Table for all cables with all types of cable sheathing/insulation					
Cable type	**Diameter (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Additional product**	**Figure**
All types of small cables	d ≤ Ø 21 mm	Without	GPG 100+50+50		**12 A**
All types of medium cables	d ≤ Ø 50 mm	Without	GPG 100+50+50	*FS-EX	**12 B**
All types of large cables	d ≤ Ø 80 mm	Without	GPG 100+50+50	*FS-EX	**12 C**
Cable bundle small cables d ≤ 21 mm	d ≤ Ø 100 mm	Without	GPG 100+50+50	*FS-EX	**12 D**
Cable bundle (F) Telecom d ≤ 21	d ≤ Ø 100 mm	Without	GPG 100+50+50	*FS-EX	**12 E**
All types of earth cables	d ≤ Ø 24 mm	Without	GPG 100+50+50		**12 F**

Installation

There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other or in a bundle, as shown below.

GPG sealant must be a thickness of 200 mm around cable bundles and single cables. In thinner wall structures ≤ 200 mm, an additional sealant must be cast around cables on either side of the wall, 50 mm wide x 30 mm thick as shown in **figure 12.**

Figure 12 A. Cable d ≤ Ø 21 mm

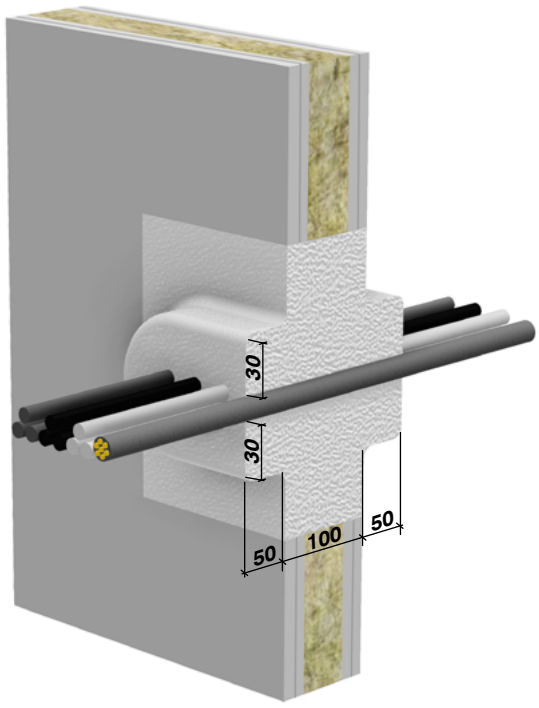
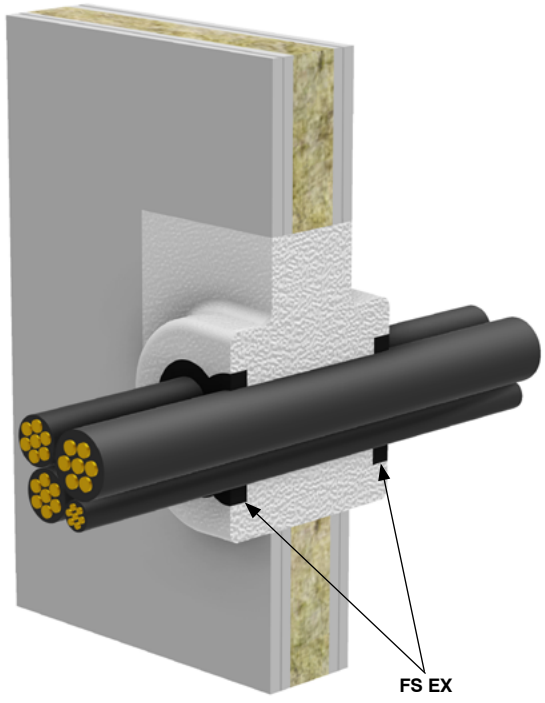


Figure 12 B. Cable d ≤ Ø 50 mm



* For all types of cable bundles shown in figures 12 B -12 E, Firesafe EX - intumescent sealant must be applied in the GPG mortar from both sides of the wall. Width 15 mm x depth 20 mm.

Flexible and Rigid wall ≥ 100 mm

Figure 12 C. Cable d ≤ Ø 80 mm

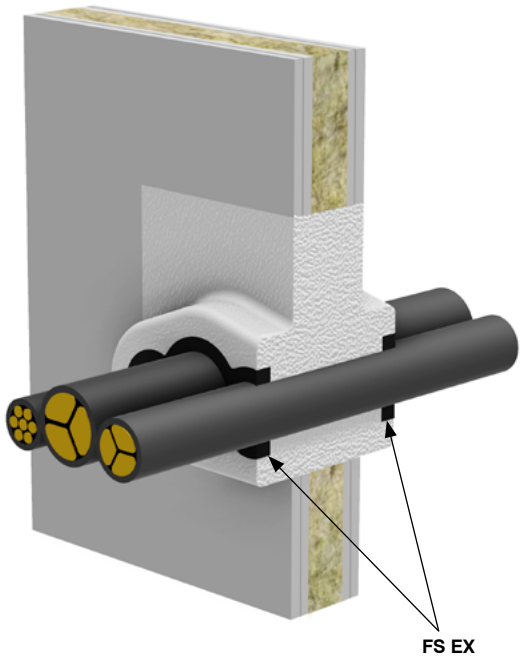


Figure 12 D. Cable d ≤ Ø 100 mm

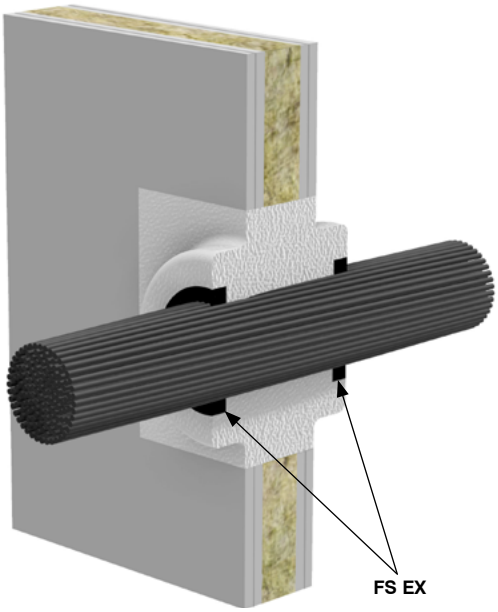


Figure 12 E. Cable bundle d ≤ 100 mm Telecom

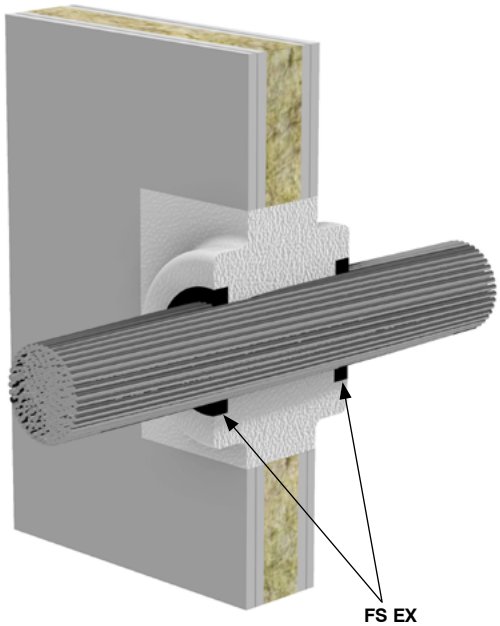
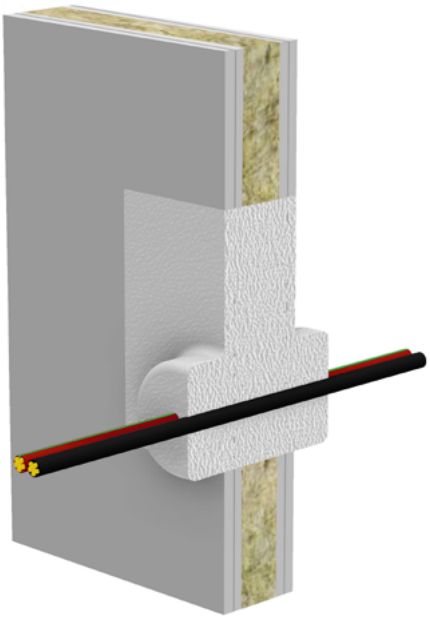


Figure 12 F. All types of earth cables d ≤ Ø 24 mm



Flexible and Rigid wall ≥ 100 mm

Table: 11

Fire resistance class E 120 / EI 90					
Flexible and Rigid wall ≥ 100 mm. Large cable penetrations ≤ 700 x 700 mm. Table for all cables with all types of cable sheathing/insulation					
Cable type	**Diameter (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Additional product**	**Figure**
All types of large cables	d ≤ Ø 80 mm	With and without	GPG 100 + 50 + 50		**13**
Cable bundle small cables d ≤ 21 mm	d ≤ Ø 100 mm	With and without	GPG 100 + 50 + 50	*FS-EX	
Cable bundle (F) Telecom d ≤ 21	d ≤ Ø 100 mm	With and without	GPG 100 + 50 + 50	*FS-EX	
All types of earth cables	d ≤ Ø 24 mm	With and without	GPG 100 + 50 + 50		

Table: 12

Fire resistance class E 120 / EI 60					
Flexible and Rigid wall ≥ 100 mm. Large cable penetrations ≤ 700 x 700 mm. Table for all cables with all types of cable sheathing/insulation					
Cable type	**Diameter (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm)**	**Additional product**	**Figure**
All types of large cables	d ≤ Ø 80 mm	Without	GPG 100		**14**
Cable bundle small cables d ≤ 21 mm	d ≤ Ø 100 mm	Without	GPG 100	*FS-EX	
Cable bundle (F) Telecom d ≤ 21	d ≤ Ø 100 mm	Without	GPG 100	*FS-EX	
All types of earth cables	d ≤ Ø 24 mm	Without	GPG 100		

Installation

There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other or in a bundle, as shown below.

GPG sealant must be a thickness of 200 mm around cable bundles and single cables. In thinner wall structures ≤ 200 mm, an additional sealant must be cast around cables and cable trays on either side of the wall, 50 mm wide x 50 mm thick as shown in **figure 13.**

Figure 13. Thickness of GPG 100 + 50 +50 mm

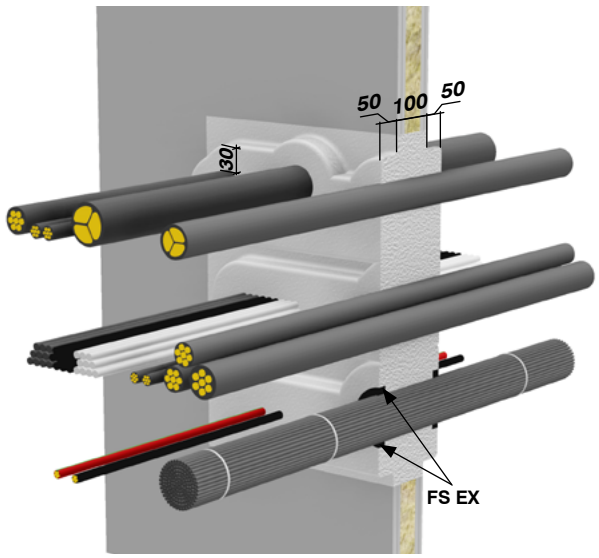
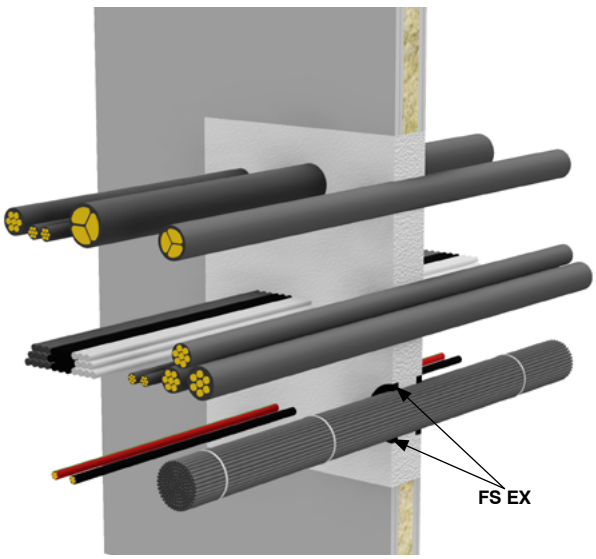


Figure 14. Thickness of GPG 100 mm



* For cable bundles d ≤ Ø 100 with small cables and cable bundles d ≤ Ø 100 with telecom, Firesafe EX - intumescent sealant must be applied in the GPG mortar from both sides of the wall. Width 15 mm x depth 20 mm.

Flexible and Rigid wall ≥ 100 mm

Table: 13

Fire resistance class E 90 / EI 60					
Flexible and Rigid wall ≥ 100 mm. Large cable penetrations ≤ 1200 x 1200 mm					
Cable type	**Diameter (d)**	**Cable ladder or cable tray**	**Thickness of GPG (mm) from both sides**	**Backing, type, density, thickness (mm)**	**Figure**
All types of aluminium cables	28 ≤ d ≤ 50 mm	With and without	GPG 40	Stone wool 150kg/m3, 20	**15 and 16**

Installation

There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other.

The aperture is insulated with 20 mm stone wool, density 150 kg/m^3.

The stone wool insulation must fit tightly. GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water.

GPG sealant is applied flush with the wall on both sides.

Figure 15. Thickness of GPG 40 mm from both sides

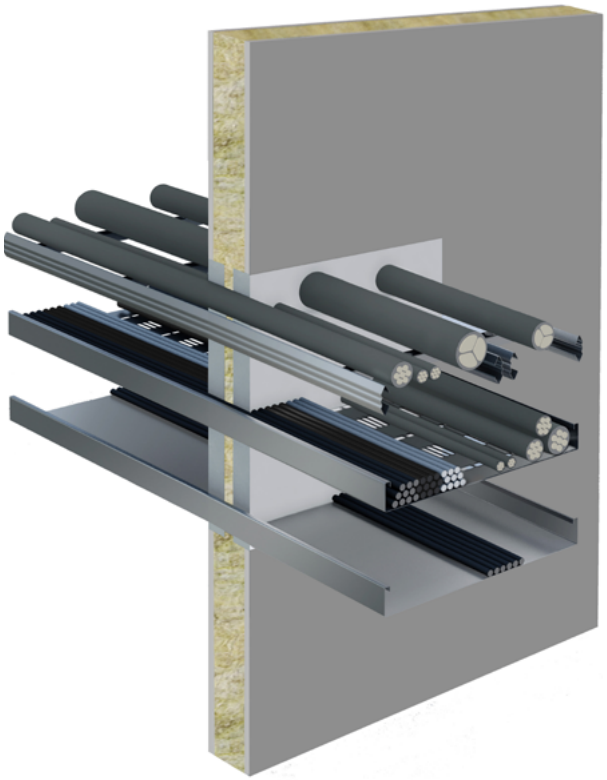
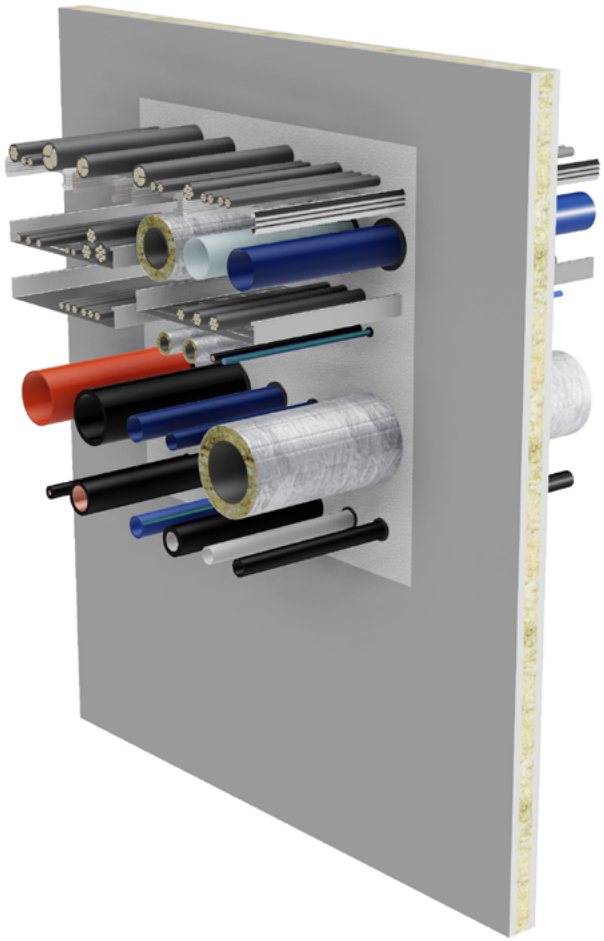


Figure 16. Thickness of GPG 40 mm from both sides



Flexible and Rigid wall ≥ 100 mm / Rigid floor ≥ 150 mm

Table: 14

Fire resistance class E 120 / EI 120			
Flexible and Rigid wall ≥ 100 mm. Large and small cable penetrations ≤ 1200 x 1200mm. Rigid floor ≥ 150 mm. Large and small cable penetrations ≤ 1800 x 900 mm			
Pipe type	**Diameter (d)**	**Thickness of GPG (mm)**	**Figure**
Plastic electrical conduits d ≤ Ø 32 mm	d ≤ Ø 32 mm	100	**17**
Plastic electrical conduits d ≤ Ø 32 mm	d ≤ Ø 32 mm	100	**18**

Installation

Plastic electrical conduits: If there are several pipes in the same aperture, the distance between the pipes must be at least 15 mm.
GPG sealant must be a minimum thickness of 100 mm with and without stone wool insulation.
GPG mortar is applied flush with the top of the slab or flush with the wall on both sides.

Figure 17. Thickness of GPG 100 mm

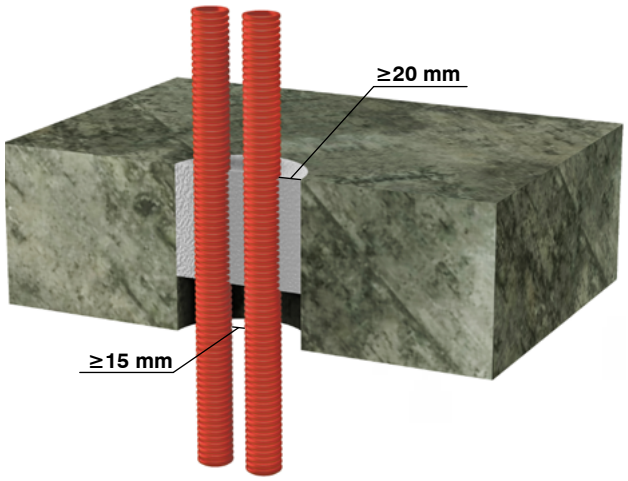
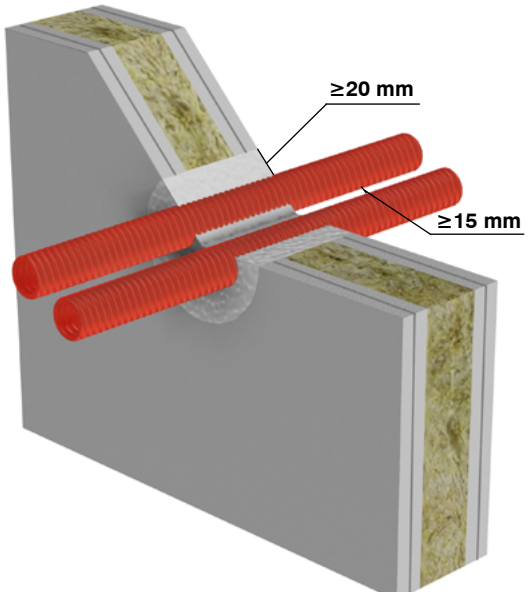


Figure 18. Thickness of GPG from both sides



Pipe penetrations

The distance between pipes should be 20–30 mm to ensure compliance with requirements for sealant thickness between the pipes. The pipe can be at any angle between 90° and 45° to the wall or the floor. All solutions in the tables for multiple penetrations (several installations through the same aperture) can be used for single penetrations, provided the same sealant thickness of GPG is used.

Explanations of abbreviations for pipe insulation (ref. 1366-3: 2009, Table 1):

CS:	Specified insulation is continuous through the entire length of the pipe, including the penetration.
LS:	Specified insulation locally with specified length out from the wall/floor on both sides and through the penetration.
LI:	Specified insulation locally with specified length from the wall/floor on both sides, but interrupted through the penetration.

Tested solutions for insulating pipes were executed such that all possible variations were covered (ref. 1366-3: 2009):

LI:	Pipe insulation is interrupted in the penetration. Installations with glass wool pipe insulation can also use pipe insulation of stone wool or ceramic fibre.
LS:	Specified insulation with specified length out from the wall/floor on both sides and through the penetration. Installations with ULTIMATE can also use pipe insulation of stone wool or ceramic fibre.
CS:	Specified insulation is continuous through the entire length of the pipe, including the penetration. Can also be used for steel and copper pipes with pipe insulation of glass wool and FS Wrap LX.
CS – **LS** – **LI:**	Thickness and density of the pipe insulation in the tables can be increased but not decreased.
CS – LS – LI:	Lengths of pipe insulation can be increased but not decreased.

Explanations of abbreviations for pipe end configuration in test (ref. NS-EN 1366-3: 2009, Table 2):

U/C:	Uncapped/Capped, non-ventilated pipe systems e.g. cold and hot water pipes.
U/U:	Uncapped/Uncapped, ventilated pipe systems e.g. waste water and rain water pipes.
C/C:	Capped/capped. Capped/Capped Capped pipe systems with permanent water pressure e.g. sprinkler pipes.
(t):	Wall thickness (t) is the thickness of pipes.

/ **For fire resistance class and installation details, see tables:**

Table	Type of penetration	Figure	Fire resistance class	Page
1	Rigid floor ≥ 150 mm. Single uninsulated cast iron pipe.	1	E 240 / ≤ EI 240	**19**
2	Rigid floor ≥ 150 mm. Uninsulated cast iron pipe in multiple pipe penetrations, small.	2	E 240 / ≤ EI 240	**20**
3-4	Rigid floor ≥ 150 mm. Single copper or steel pipe, insulated with glass wool. FS Wrap LX.	3-4	E 240 / ≤ EI 240	**21**
5-6	Rigid floor ≥ 150 mm. Copper or steel pipe, insulated with glass wool in multiple pipe penetrations, small. FS Wrap LX.	5	E 240 / ≤ EI 240	**22**
7	Rigid floor ≥ 150 mm. Single copper or steel pipe, insulated with cellular rubber type Glavaflex®.	6	E 240 / ≤ EI 90	**23**
8	Rigid floor ≥ 150 mm. Single steel pipe, insulated with stone wool / ULTIMATE / glass wool.	7-9	E 120 / EI 120	**24**
9	Rigid floor ≥ 150 mm. Steel pipe, insulated with stone wool / ULTIMATE in multiple pipe penetrations, large.	10-11	E 120 / EI 120	**25**
10	Rigid floor ≥ 150 mm. Single steel pipe, insulated with glass wool and single uninsulated steel pipe.	12-13	E 120 / EI 90	**26**
11	Rigid floor ≥ 250 mm. Single uninsulated cast iron pipe.	14	E 240 / ≤ EI 240	**27**
12	Rigid floor ≥ 250 mm. Uninsulated cast iron pipe in multiple pipe penetrations, small.	15	E 240 / ≤ EI 240	**28**
13	Rigid wall ≥ 100 mm. Single steel pipe, insulated with stone wool / glass wool.	16-18	E 240 / ≤ EI 120	**29**
14	Rigid wall ≥ 100 mm. Steel pipe, insulated with stone wool in multiple pipe penetrations, large.	19	E 120 / EI 120	**30**
15	Rigid wall ≥ 100 mm. Single steel pipe, insulated with stone wool.	20	E 120 / EI 90	**31**
16	Rigid wall ≥ 100 mm. Steel pipe, insulated with stone wool in multiple pipe penetrations, large.	21	E 120 / EI 90	**32**
17	Rigid wall ≥ 100 mm. Single steel pipe, insulated with glass wool.	22	E 120 / EI 60	**33**
18	Rigid wall ≥ 100 mm. Single uninsulated steel pipe.	23	E 120 / EI 30	**34**
19	Rigid wall ≥ 150 mm. Single uninsulated cast iron pipe.	24	E 240 / ≤ EI 240	**35**
20	Rigid wall ≥ 150 mm. Uninsulated cast iron pipe in multiple pipe penetrations, small.	25	E 240 / ≤ EI 240	**36**
21	Rigid wall ≥ 150 mm. Single uninsulated plastic water pipe type PE-X.	26	E 240 / EI 240	**37**
22	Rigid wall ≥ 150 mm. Single uninsulated aluminium pipe PE-X.	27	E 240 / EI 240	**38**
23-24	Rigid wall ≥ 150 mm. Single uninsulated steel pipe.	28-29	E 240 / ≤ EI 120	**39**
25	Rigid wall ≥ 150 mm. Single uninsulated copper or steel pipe.	30	E 240 / EI 30	**40**
26	Rigid wall ≥ 250 mm. Single uninsulated cast iron pipe.	31	E 240 / ≤ EI 240	**41**
27	Rigid wall ≥ 250 mm. Uninsulated cast iron pipe in multiple pipe penetrations, small.	32	E 240 / ≤ EI 240	**42**
28	Flexible and Rigid wall ≥ 100 mm. Steel pipe, insulated with stone wool / ULTIMATE in multiple pipe penetrations, large.	33	E 120 / EI 120	**43**
29	Flexible and Rigid wall ≥ 100 mm. Single steel pipe, insulated with stone wool / ULTIMATE / glass wool and single uninsulated plastic water pipe type PE-X.	34-38	E 120 / EI 120	**44-45**
30	Flexible and Rigid wall ≥ 100 mm. Steel pipe, insulated with stone wool in multiple pipe penetrations, large.	39	E 120 / EI 90	**46**
31-33	Flexible and Rigid wall ≥ 130 mm. Single copper or steel pipe, insulated with glass wool. FS Wrap LX.	40	E 240 / ≤ EI 240	**47**
34-36	Flexible and Rigid wall ≥ 130 mm. Copper or steel pipe, insulated with glass wool in multiple pipe penetrations, large. FS Wrap LX.	41	E 240 / ≤ EI 240	**48**

Rigid floor ≥ 150 mm

Table: 1

Rigid floor ≥ 150 mm. Single pipe penetrations			
Cast iron pipe: Ø 40 mm - Ø 58 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 240**
Cast iron pipe: Ø 59 mm - Ø 75 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 120**
Cast iron pipe: Ø 76 mm - Ø 110 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 90**
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Uninsulated	GPG 250	With or without backing of stone wool	**1**

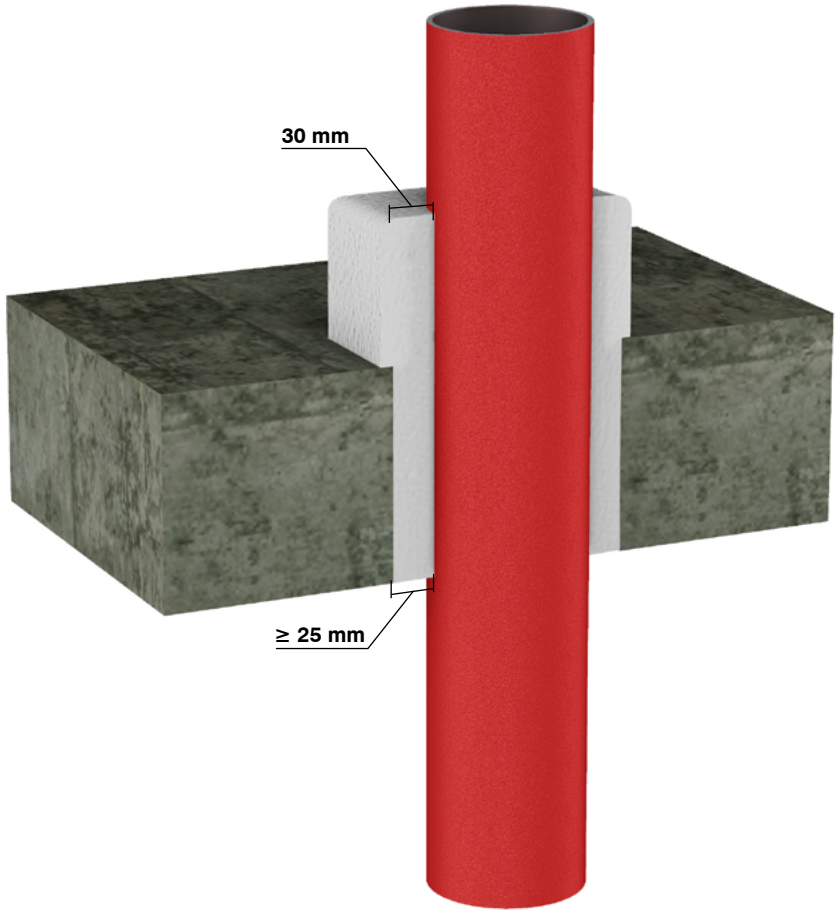
Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 250 mm, flush with the underside of the floor.

Distance between edge of penetration and pipe must be at least 25 mm.

For rigid floor structures thinner than 250 mm, an additional sealant of GPG must be cast around pipes on the top of the floor with a width of 30 mm. The total thickness of GPG must be 250 mm.

Figure 1. Thickness of GPG 250 mm



Rigid floor ≥ 150 mm

Table: 2

Rigid floor ≥ 150 mm. Multiple pipe penetrations 150 x 355 mm			
Cast iron pipe: Ø 40 mm - Ø 58 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 240**
Cast iron pipe: Ø 59 mm - Ø 75 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 120**
Cast iron pipe: Ø 76 mm - Ø 110 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 90**
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Uninsulated	GPG 250	With or without backing of stone wool	**2**

Installation

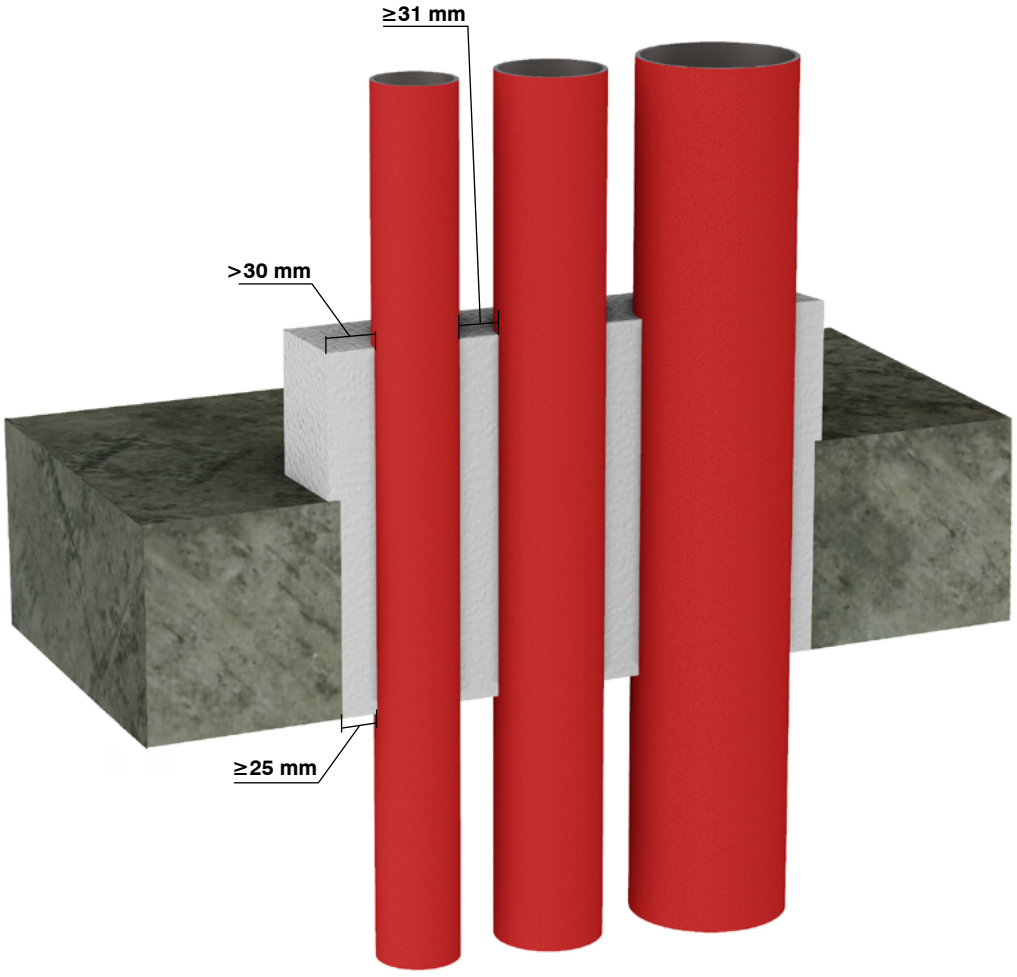
GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 250 mm, flush with the underside of the floor.

Distance between edge of penetration and pipe must be at least 25 mm.

Distance between the pipes in the same penetration must be at least 31 mm.

For rigid floor structures thinner than 250 mm, an additional sealant of GPG must be cast around pipes on the top of the floor with a width of 30 mm. The total thickness of GPG must be 250 mm.

Figure 2. Thickness of GPG 250 mm



Rigid floor ≥ 150 mm

Table: 3

Fire resistance class E 240 / EI 240				
Rigid floor ≥ 150 mm. Single pipe penetrations				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm) flush with the top of the floor**	**Additional product**	**Figure**
Copper and steel pipe: Ø 12 mm - Ø 18 mm, wall thickness (t): 1,0 mm. U/C				
* **Glass wool** 75 kg/m3	20, Fully insulatedt, CS	GPG 100	1 layer FS Wrap LX	**3**
Copper and steel pipe: Ø 22 mm - Ø 54 mm, wall thickness (t): 1,0 ≤ t ≤ 1,5. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 100	2 layers FS Wrap LX	**3**
Copper and steel pipe: Ø 40 mm - Ø 54 mm, wall thickness (t): 1,5 ≤ t ≤ 14,2 mm. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 100	2 layers FS Wrap LX	**3**

Tabell: 4

Fire resistance class E 240 / EI 180				
Copper and steel pipe: Ø 54 mm - Ø 76 mm, wall thickness (t): 2,0 ≤ t ≤ 14,2 mm. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 100	3 layers FS Wrap LX	**4**

Installation

CS: Specified insulation is continuous through the entire length of the pipe, including the penetration.

FIRESAFE Wrap LX is mounted on pipe around pipe insulation on the bottom of the floor with the number of layers as described in the tables above.

FIRESAFE Wrap LX is applied on pipe in lower edge of rigid floor flush with fire sealant.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 100 mm, flush with the top of the floor.

Distance between edge of penetration and pipe must be at least 22 mm (Including Wrap).

FIRESAFE Wrap LX shall be installed on lower edge of rigid floor flush with the fire sealant. Wrap LX shall be visible in the sealant after fire sealing is completed.

Figure 3. Thickness of GPG 100 mm

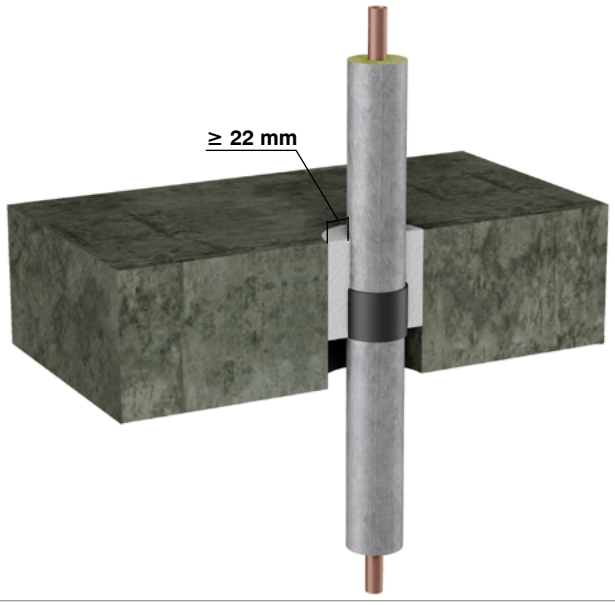
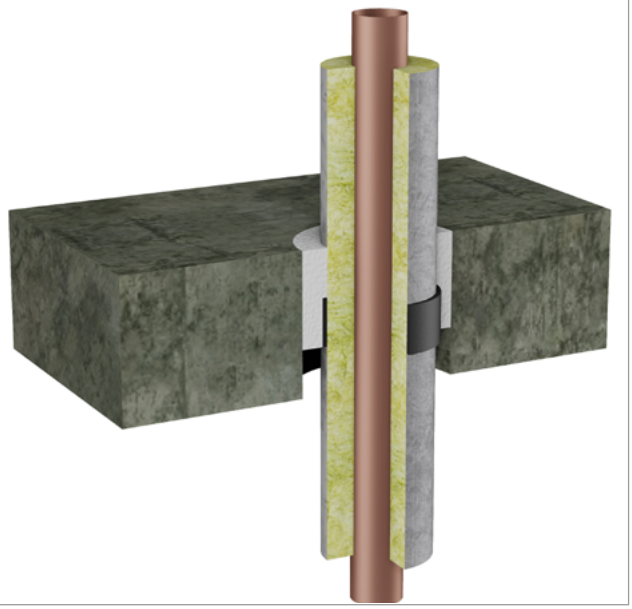


Figure 4. Thickness of GPG 100 mm



* Pipe insulation type glass wool ISOVER ClimPipe Section Alu2, glass wool with density 75 kg/m3. Fire resistance class $A2_L$-s1, d0.

Rigid floor ≥ 150 mm

Table: 5

Fire resistance class E 240 / EI 240				
Rigid floor ≥ 150 mm. Multiple pipe penetrations 210 x 620 mm				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm) flush with the top of the floor**	**Additional product**	**Figure**
Copper and steel pipe: Ø 12 mm - Ø 18 mm, wall thickness (t): 1,0 mm. U/C				
* **Glass wool** 75 kg/m3	20, Fully insulated, CS	GPG 100	1 layer FS Wrap LX	**5**
Copper and steel pipe: Ø 22 mm - Ø 54 mm, wall thickness (t): 1,0 ≤ t ≤ 1,5. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 100	2 layers FS Wrap LX	**5**
Copper and steel pipe: Ø 40 mm - Ø 54 mm, wall thickness (t): 1,5 ≤ t ≤ 14,2 mm. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 100	2 layers FS Wrap LX	**5**

Table: 6

Fire resistance class E 240 / EI 180				
Copper and steel pipe: Ø 54 mm - Ø 76 mm, wall thickness (t): 2,0 ≤ t ≤ 14,2 mm. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 100	3 layers FS Wrap LX	**5**

Installation

CS: Specified insulation is continuous through the entire length of the pipe, including the penetration.
FIRESAFE Wrap LX is mounted on pipe around pipe insulation on the bottom of the floor with the number of layers as described in the tables above.

FIRESAFE Wrap LX is applied on pipe in lower edge of rigid floor flush with fire sealant.

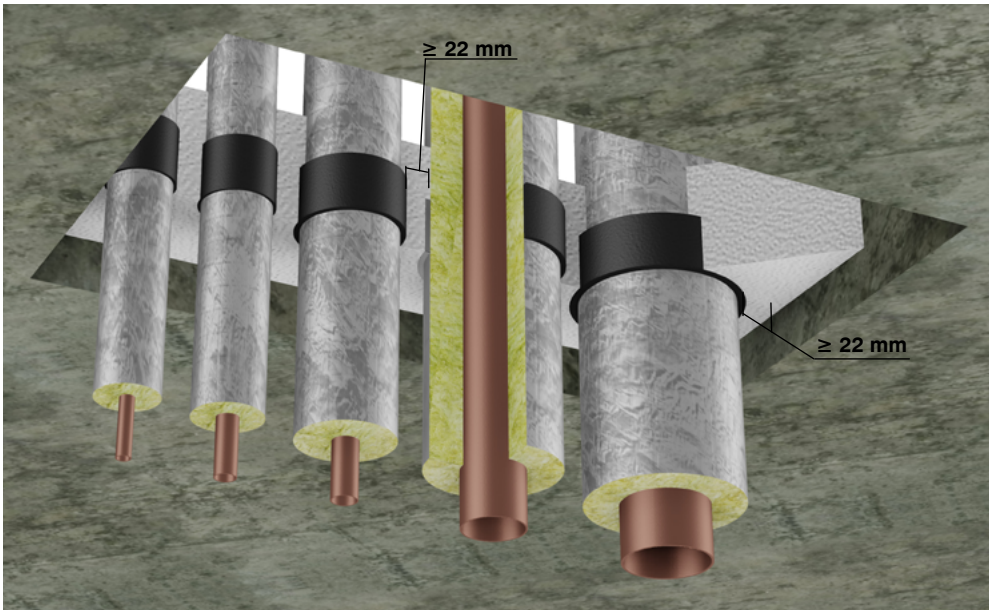
GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 100mm, flush with the top of the floor.

Distance between edge of penetration and pipe must be at least 22 mm (Including Wrap).

Distance between the pipes in the same penetration must be at least 22 mm (Including Wrap).

FIRESAFE Wrap LX shall be installed on lower edge of rigid floor flush with the fire sealant. Wrap LX shall be visible in the sealant after fire sealing is completed.

Figure 5. Thickness of GPG 100 mm



* Pipe insulation type glass wool ISOVER ClimPipe Section Alu2, glass wool with density 75 kg/m3. Fire resistance class $A2_L$-s1, d0.

Rigid floor ≥ 150 mm

Table: 7

Rigid floor ≥ 150 mm. Single pipe penetrations			
Copper and steel pipe: Ø 12 mm, wall thickness (t): 1,0 mm. C/C			**Fire resistance class E 240 / EI 90**
Copper and steel pipe: Ø 13 mm - Ø 18 mm, wall thickness (t): 1,0 mm. C/C			**Fire resistance class E 240 / EI 60**
Copper and steel pipe: Ø 19 – Ø 23 mm, wall thickness (t): 1,0 mm. C/C			**Fire resistance class E 240 / EI 45**
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm) flush with the top of the floor**	**Figure**
Cellular rubber 60 - 80 kg/m3 Glavaflex®	3 mm LS, throughout 150 mm or full thickness of the floor	GPG 150	**6**

Installation

LS: Specified insulation locally with specified length out from the floor on both sides and through the penetration.

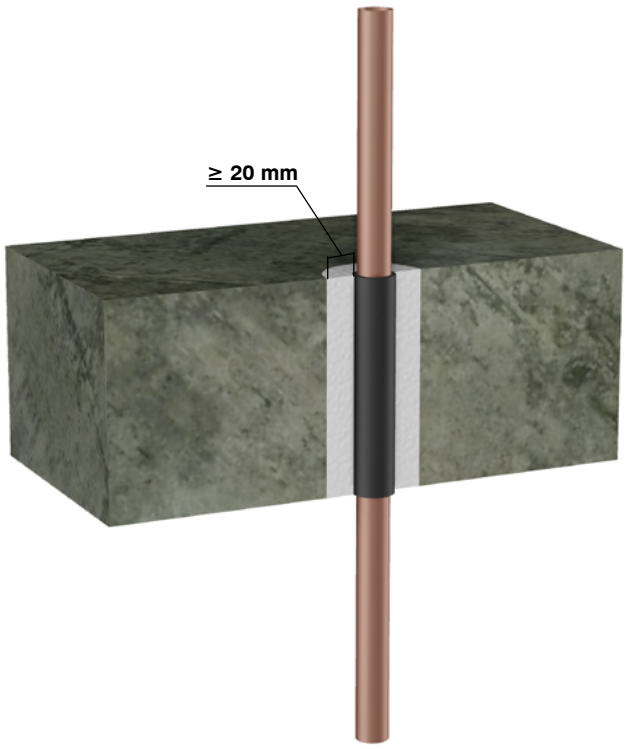
GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied with at least 150 mm thickness.

3 mm cellular rubber type Glavaflex® with a self-adhesive tape that can be applied to cold or hot metallic pipes of steel or copper for protection against condensation, external moisture, corrosion or protection of movement in the pipes.

Cellular rubber type Glavaflex® is applied to the pipe throughout the entire thickness or at least 150 mm in length before fire sealing with FIRESAFE GPG MORTAR.

Distance between edge of penetration and pipe must be at least 20 mm.

Figure 6. Thickness of GPG 150 mm



* Pipe insulation of cellular rubber must be type Glavaflex® 3 mm. Fire resistance class B/B_L-s3,d0.

Rigid floor ≥ 150 mm

Table: 8

Fire resistance class E 120 / EI 120				
Rigid floor ≥ 150 mm. Single pipe penetrations				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm) flush with the top of the floor**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter(D): 40 ≤ D ≤ 42 mm, wall thickness (t): 2,6 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	20, 550, LS	GPG 50	Stone wool 40 kg/m3, 50	**7**
ULTIMATE 80 kg/m3	20, 550, LS	GPG 50	Stone wool 40 kg/m3, 60	
* **Glass wool** 75 kg/m3	40, 600, LI	GPG 50	Stone wool 40 kg/m3, 100	**8**
Steel pipe: Diameter(D): 42 ≤ D ≤ 168,3 mm, wall thickness (t): 4,5 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	30, 550, LS	GPG 50	Stone wool 40 kg/m3, 50	**9**
ULTIMATE 80 kg/m3	30, 550, LS	GPG 50	Stone wool 40 kg/m3, 60	

Installation

LS: Specified insulation locally with specified length out from the floor on both sides and through the penetration. See **figures 7 and 9.**
LI: Specified insulation locally with specified length from the floor on both sides, but interrupted through the penetration. See **figure 8.**
Penetrations must be carefully filled with loose stone wool in the density and thickness as described in the tables above.
GPG mortar is mixed to a fluid consistency with 2 parts GPG and 1 part water. GPG mortar is applied flush with the top of the floor.

Figure 7. Thickness of GPG 50 mm. Continuous pipe insulation 20 mm thick, with 550 mm extending out on each side of the floor

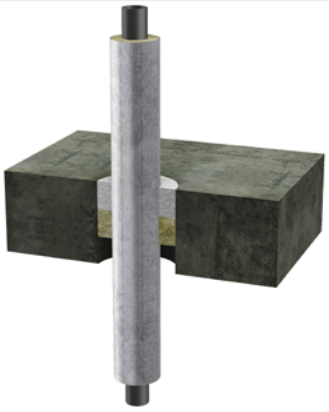


Figure 8. Thickness of GPG 50 mm. Interrupted pipe insulation 40 mm thick, with 600 mm extending out on each side of the floor

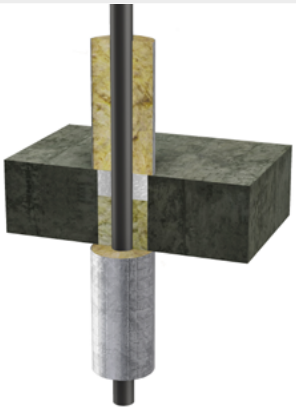
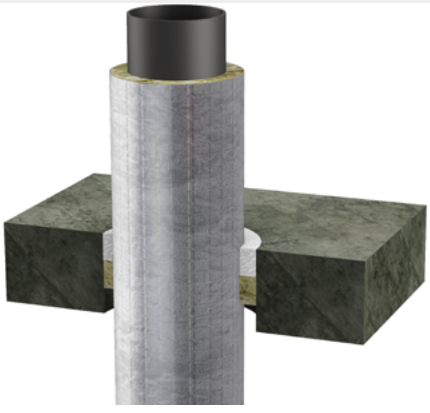


Figure 9. Thickness of GPG 50 mm. Continuous pipe insulation 30 mm thick, with 550 mm extending out on each side of the floor



* Pipe insulation type glass wool ISOVER ClimPipe Section Alu2, glass wool with density 75 kg/m3. Fire resistance class $A2_L$-s1, d0.

Rigid floor ≥ 150 mm

Table: 9

Fire resistance class E 120 / EI 120				
Rigid floor ≥ 150 mm. Large pipe penetrations ≤ 1000 x 1000 mm				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm) flush with the top of the floor**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter (D): 40 ≤ D ≤ 42 mm, wall thickness (t): 2,6 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	20, 1150, LS	GPG 50	Stone wool 150 kg/m3, 50	**10**
ULITMATE 80 kg/m3	20, 1150, LS	GPG 50	Stone wool 150 kg/m3, 50	
Steel pipe: Diameter (D): 42 ≤ D ≤ 219 mm, wall thickness (t): 3,2 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	30, 1150, LS	GPG 50	Stone wool 150 kg/m3, 50	**11**
ULTIMATE 80 kg/m3	30, 1150, LS	GPG 50	Stone wool 150 kg/m3, 50	

Installation

LS: Specified insulation locally with specified length out from the floor on both sides and through the penetration.

Distance between the pipes in the same penetration must be at least 30 mm

Large apertures are insulated with 50 mm of stone wool, density 150kg/m3. The stone wool insulation must fit tightly. Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly.

GPG mortar is mixed to a fluid consistency with 2 parts GPG and 1 part water. GPG mortar is applied flush with the top of the floor.

Figure 10. Thickness of GPG 50 mm. Continuous pipe insulation 20 mm thick, with 1150 mm extending out on each side of the floor

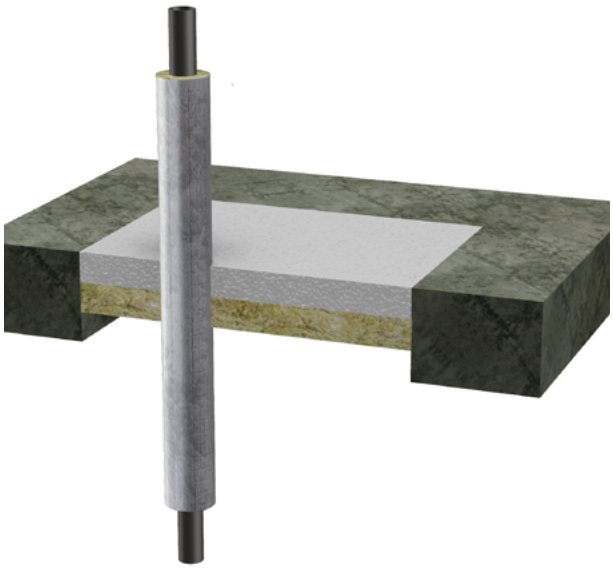
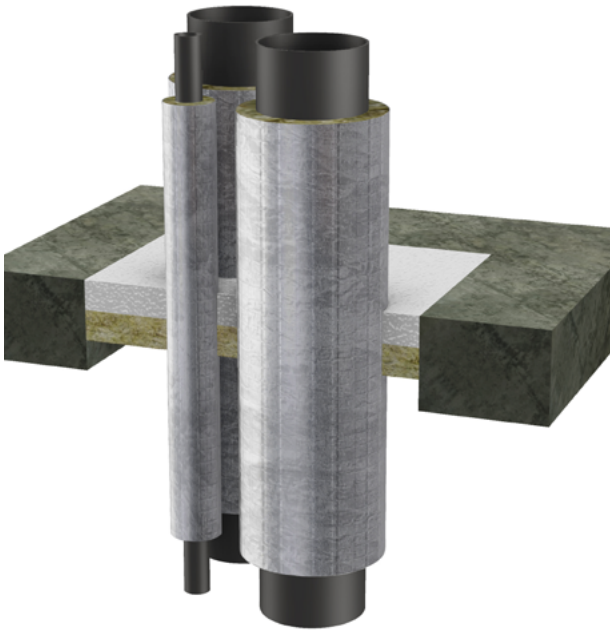


Figure 11. Thickness of GPG 50 mm. Continuous pipe insulation 30 mm thick, with 1150 mm extending out on each side of the floor



Rigid floor ≥ 150 mm

Table: 10

Fire resistance class E 120 / EI 90				
Rigid floor ≥ 150 mm. Single pipe penetrations				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm) flush with the top of the slab**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter(D): 42 ≤ D ≤ 168,3 mm, wall thickness (t): 4,5 ≤ t ≤ 14,2 mm. U/C				
* **Glass wool** 75 kg/m3	50, 600, LI	GPG 50	Stone wool 40 kg/m3, 100	**12**
Steel pipe: Diameter D = 48 mm. Wall thickness 2,6 mm. U/C				
Uninsulated		GPG 100	Stone wool 150 kg/m3, 50	**13**

Installation

LI: Specified insulation locally with specified length from the floor on both sides, but interrupted through the penetration. See the **figure 12.**

Penetrations must be carefully filled with loose stone wool in the density and thickness as described in the tables above.

GPG mortar is mixed to a fluid consistency with 2 parts GPG and 1 part water.

GPG mortar is applied flush with the top of the floor.

Figure 12. Thickness of GPG 50 mm. Interrupted pipe insulation 50 mm thick, with 600 mm extending out on each side of the floor

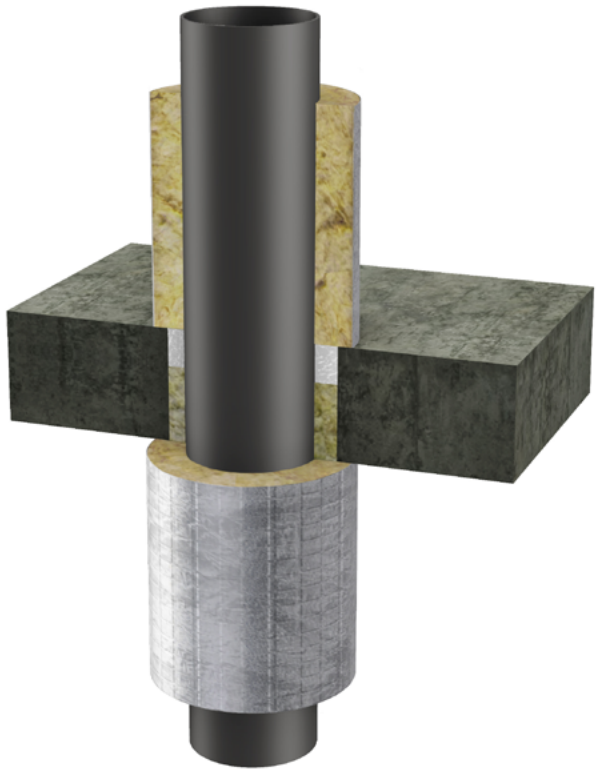


Figure 13. Thickness of GPG 100 mm. Pipes without insulation

* Pipe insulation type glass wool ISOVER ClimPipe Section Alu2, glass wool with density 75 kg/m3. Fire resistance class $A2_L$-s1, d0.

Rigid floor ≥ 250 mm

Table: 11

Rigid floor ≥ 250 mm. Single pipe penetrations			
Cast iron pipe: Ø 40 mm - Ø 58 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 240**
Cast iron pipe: Ø 59 mm - Ø 75 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 120**
Cast iron pipe: Ø 76 mm - Ø 110 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 90**
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Uninsulated	GPG 250	With or without backing of stone wool	**14**

Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 250 mm, flush with the underside of the floor.

Distance between edge of penetration and pipe must be at least 25 mm.

Figure 14. Thickness of GPG 250 mm

Rigid floor ≥ 250 mm

Table: 12

Betongdekke ≥ 250 mm. Small pipe penetrations 150 x 355 mm			
Cast iron pipe: Ø 40 mm - Ø 58 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 240**
Cast iron pipe: Ø 59 mm - Ø 75 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 120**
Cast iron pipe: Ø 76 mm - Ø 110 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 90**
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Uninsulated	GPG 250	With or without backing of stone wool	**15**

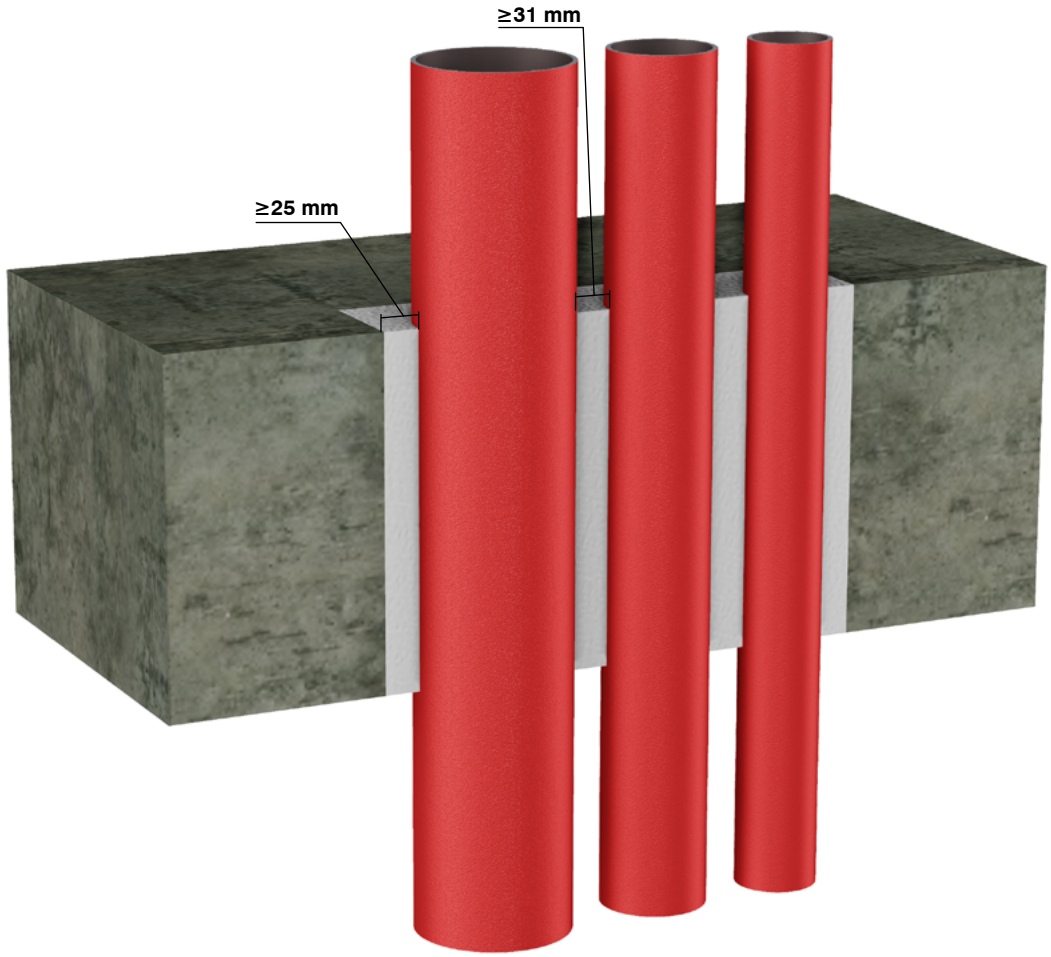
Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 250 mm, flush with the underside of the floor.

Distance between edge of penetration and pipe must be at least 25 mm.

Distance between the pipes in the same penetration must be at least 31 mm.

Figure 15. Thickness of GPG 250 mm



Rigid wall ≥ 100 mm

Table: 13

Fire resistance class E 120 / EI 120				
Rigid wall ≥ 100 mm. Single pipe penetrations				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter(D): 40 ≤ D ≤ 42 mm, wall thickness (t): 2,6 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	20, 550, LS	GPG 50	Stone wool 60 kg/m3, 50	**16**
* **Glass wool** 75 kg/m3	40, 600, LI	GPG 50	Stone wool 60 kg/m3, 50	**17**
Steel pipe: Diameter(D): 42 ≤ D ≤ 168,3 mm, wall thickness (t): 4,5 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	30, 1150, LS	GPG 50	Stone wool 60 kg/m3, 50	**18**

Installation

LS: Specified insulation locally with specified length out from the wall on both sides and through the penetration. See **figures 16 and 18.**

LI: Specified insulation locally with specified length from the wall/slab on both sides, but interrupted through the penetration. See **figure 17.** Penetrations must be carefully filled with loose stone wool in the density and thickness as described in the tables above.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG is applied flush with the wall on one side.

Figure 16. Thickness of GPG 50 mm. Continuous pipe insulation 20 mm thick, with 550 mm extending out on each side of the wall

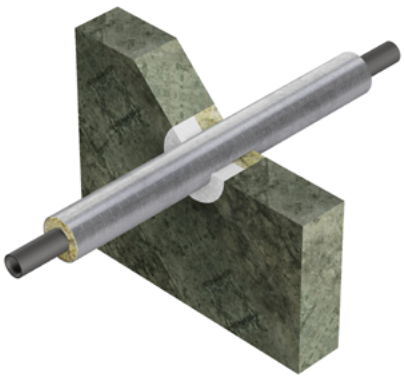
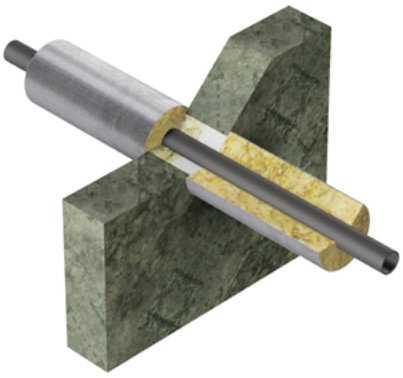
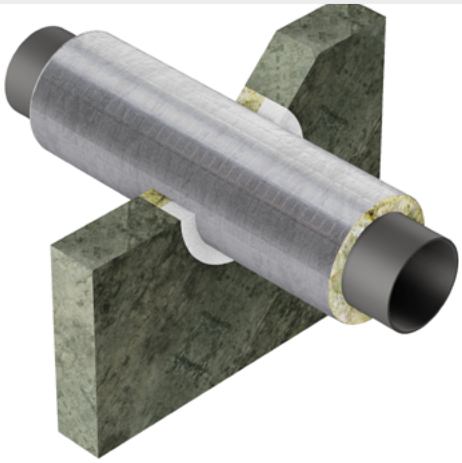


Figure 17. Thickness of GPG 50 mm. Interrupted pipe insulation 40 mm thickness, with 600 mm extending out on each side of the wall



Figur 18. Thickness of GPG 50 mm. Continuous pipe insulation 30 mm thick, with 1150 mm extending out on each side of the wall



* Pipe insulation type glass wool ISOVER ClimPipe Section Alu2, glass wool with density 75 kg/m3. Fire resistance class $A2_L$-s1, d0.

Rigid wall ≥ 100 mm

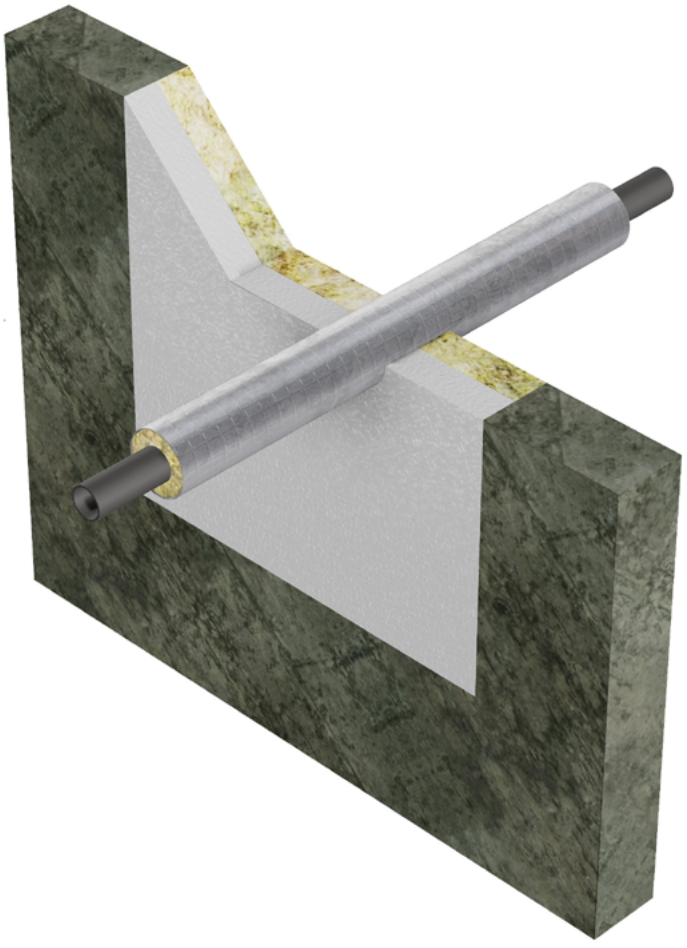
Table: 14

Fire resistance class E 120 / EI 120				
Rigid wall ≥ 100 mm. Large pipe penetrations ≤ 1000 x 1000 mm				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter (D): 40 ≤ D ≤ 42 mm, wall thickness (t): 2,6 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	20, 1150, LS	GPG 50	Stone wool 150 kg/m3, 50	**19**

Installation

LS: Specified insulation locally with specified length out from the wall on both sides and through the penetration.
Penetrations must be carefully filled with loose stone wool in the density and thickness as described in the tables above.
GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG is applied flush with the wall on one side.

Figure 19. Thickness of GPG 50 mm. Continuous pipe insulation 20 mm thick, with 1150 mm extending out on each side of the wall



Rigid wall ≥ 100 mm

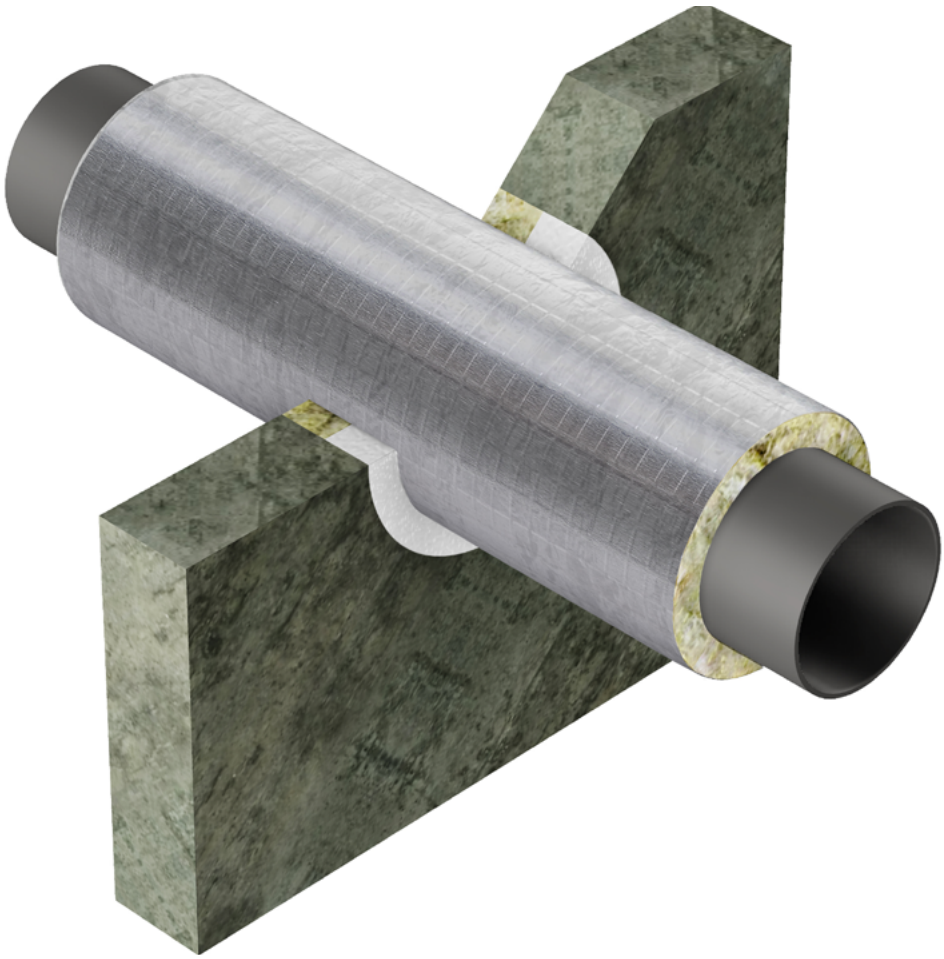
Table: 15

Fire resistance class E 120 / EI 90				
Rigid wall ≥ 100 mm. Single pipe penetrations				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter(D): 42 ≤ D ≤ 168,3 mm, wall thickness (t): 4,5 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	30, 550, LS	GPG 50	Stone wool 60 kg/m3, 50	**20**

Installation

LS: Specified insulation locally with specified length out from the wall on both sides and through the penetration.
Penetrations must be carefully filled with loose stone wool in the density and thickness as described in the tables above.
GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG is applied flush with the wall on one side.

Figure 20. Thickness of GPG 50 mm. Continuous pipe insulation 30 mm thick, with 550 mm extending out on each side of the wall



Rigid wall ≥ 100 mm

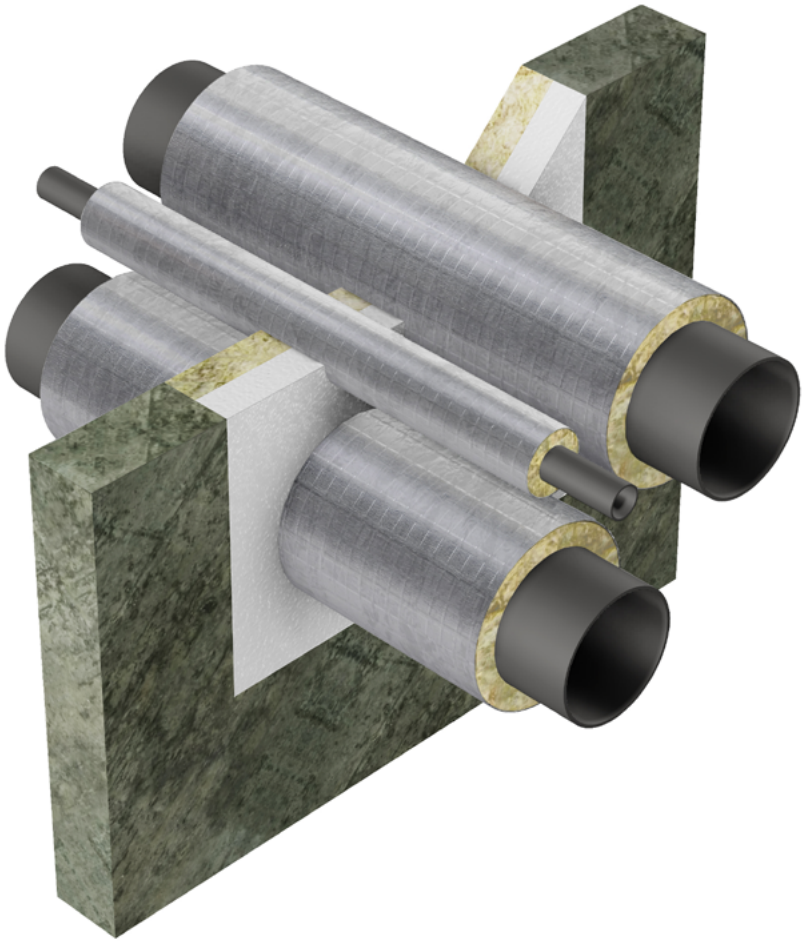
Table: 16

Fire resistance class E 120 / EI 90				
Rigid wall ≥ 100 mm. Large pipe penetrations ≤ 1000 x 1000 mm				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter(D): 42 ≤ D ≤ 219 mm, wall thickness (t): 3,2 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	30, 1150, LS	GPG 50	Stone wool 150 kg/m3, 50	**21**

Installation

LS: Specified insulation locally with specified length out from the wall on both sides and through the penetration.
Penetrations must be carefully filled with loose stone wool in the density and thickness as described in the tables above.
GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG is applied flush with the wall on one side.

Figure 21. Thickness of GPG 50 mm. Continuous pipe insulation 30 mm thick, with 1150 mm extending out on each side of the wall



Rigid wall ≥ 100 mm

Table: 17

Fire resistance class E 120 / EI 60				
Rigid wall ≥ 100 mm. Single pipe penetrations				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter(D): 42 ≤ D ≤ 168,3 mm, wall thickness (t): 4,5 ≤ t ≤ 14,2 mm. U/C				
* **Glass wool** 75 kg/m3	50, 600, LI	GPG 50	Stone wool 60 kg/m3, 50	**22**

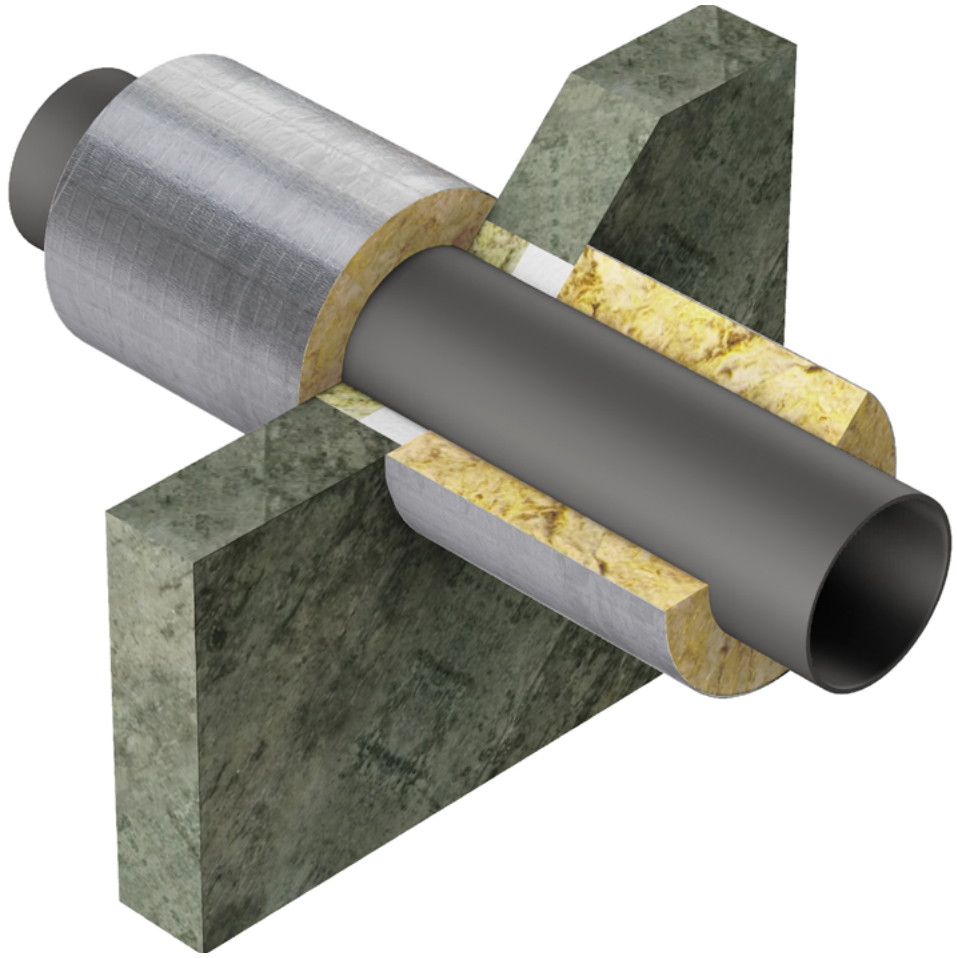
Installation

LI: Specified insulation locally with specified length from the wall on both sides, but interrupted through the penetration.

Penetrations must be carefully filled with loose stone wool in the density and thickness as described in the tables above.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied flush with the wall on one side.

Figure 22. Thickness of GPG 50 mm. Interrupted pipe insulation 50 mm thick, with 600 mm extending out on each side of the wall



* Pipe insulation type glass wool ISOVER ClimPipe Section Alu2, glass wool with density 75 kg/m3. Fire class $A2_L$-s1, d0.

Rigid wall ≥ 100 mm

Table: 18

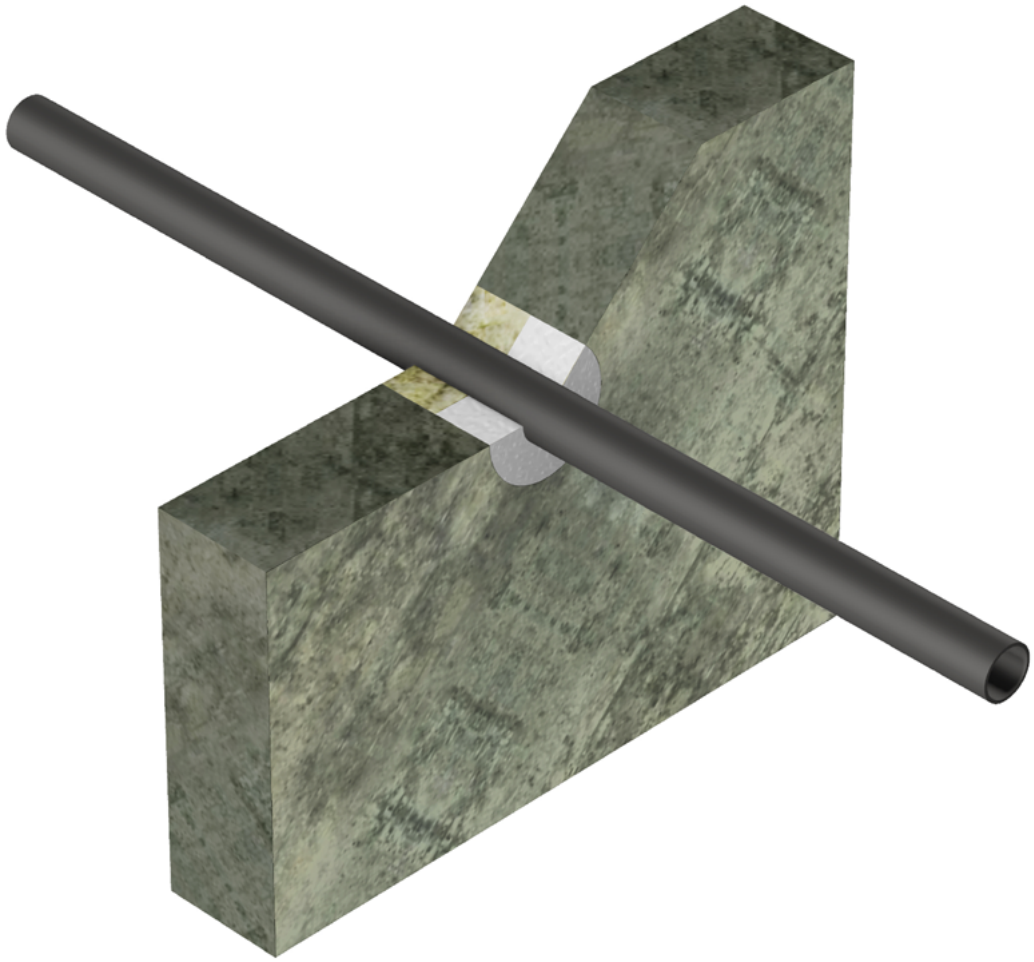
Fire resistance class E 120 / EI 30				
Rigid wall ≥ 100 mm. Single pipe penetrations				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter D ≤ 48 mm. Wall thickness 2,6 mm. C/C				
Uninsulated	Uninsulated	GPG 50	Stone wool 60 kg/m3, 50	**23**

Installation

Penetrations must be carefully filled with loose stone wool in the density and thickness as described in the tables above.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied flush with the wall on one side.

Figure 23. Thickness of GPG 50 mm



Rigid wall ≥ 150 mm

Table: 19

Rigid wall ≥ 150 mm. Single pipe penetrations			
Cast iron pipe: Ø 40 mm - Ø 58 mm, wall thickness (t): 3,5≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 240**
Cast iron pipe: Ø 59 mm - Ø 75 mm, wall thickness (t): 3,5≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 120**
Cast iron pipe: Ø 76 mm - Ø 110 mm, wall thickness (t): 3,5≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 60**
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Uninsulated	GPG 250	With or without backing of stone wool	**24**

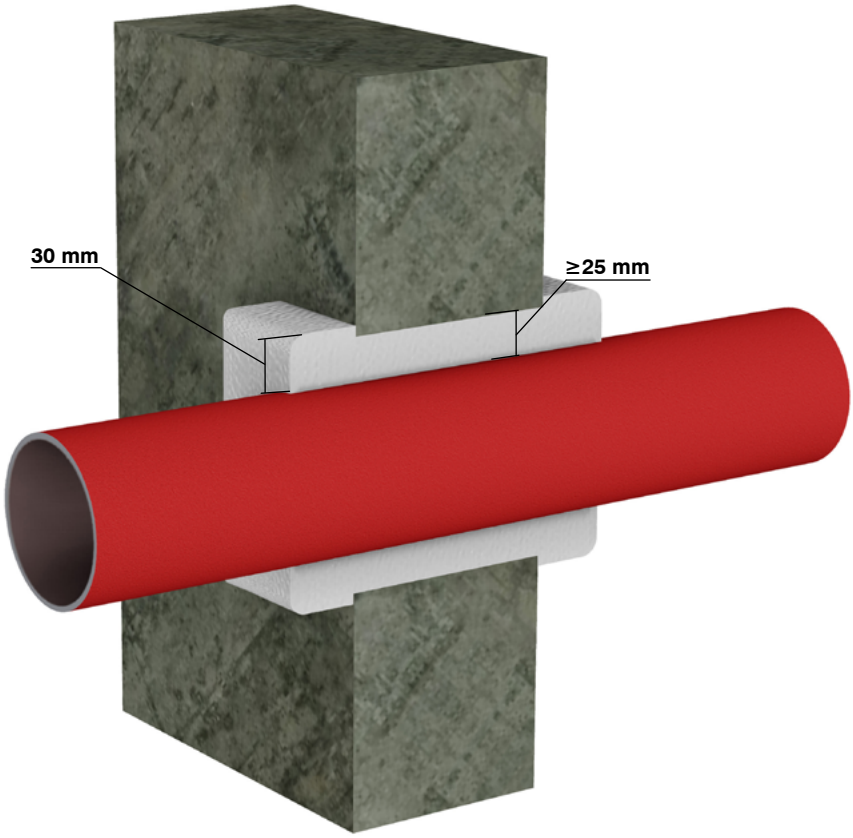
Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 250 mm.

Distance between edge of penetration and pipe must be at least 25 mm.

For rigid wall structures thinner than 250 mm, an additional sealant of GPG must be cast around pipes on both sides of the wall with a width of 30 mm. The total thickness of GPG must be 250 mm.

Figure 24. Thickness of GPG 250 mm



Rigid wall ≥ 150 mm

Table: 20

Rigid wall ≥ 150 mm. Small pipe penetrations 150 x 355 mm			
Cast iron pipe: Ø 40 mm - Ø 58 mm, wall thickness (t): 3,5≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 240**
Cast iron pipe: Ø 59 mm - Ø 75 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 120**
Cast iron pipe: Ø 76 mm - Ø 110 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 90**
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Uninsulated	GPG 250	With or without backing of stone wool	**25**

Installation

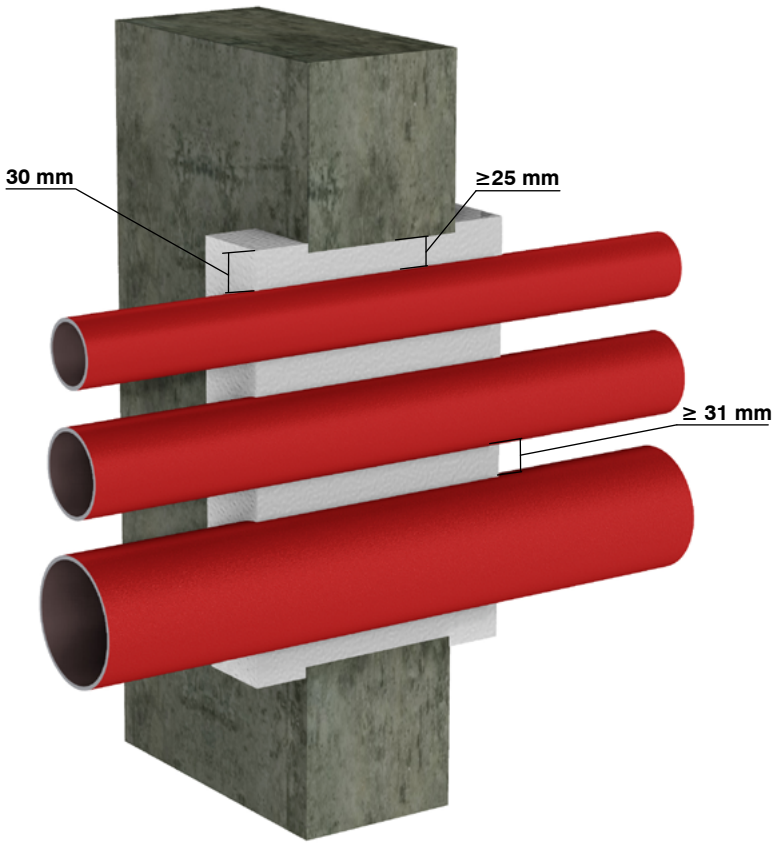
GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 250 mm.

Distance between edge of penetration and pipe must be at least 25 mm.

Distance between the pipes in the same penetration must be at least 31 mm.

For rigid wall structures thinner than 250 mm, an additional sealant of GPG must be cast around pipes on both sides of the wall with a width of 30 mm. The total thickness of GPG must be 250 mm.

Figure 25. Thickness of GPG 250 mm



Rigid wall ≥ 150 mm

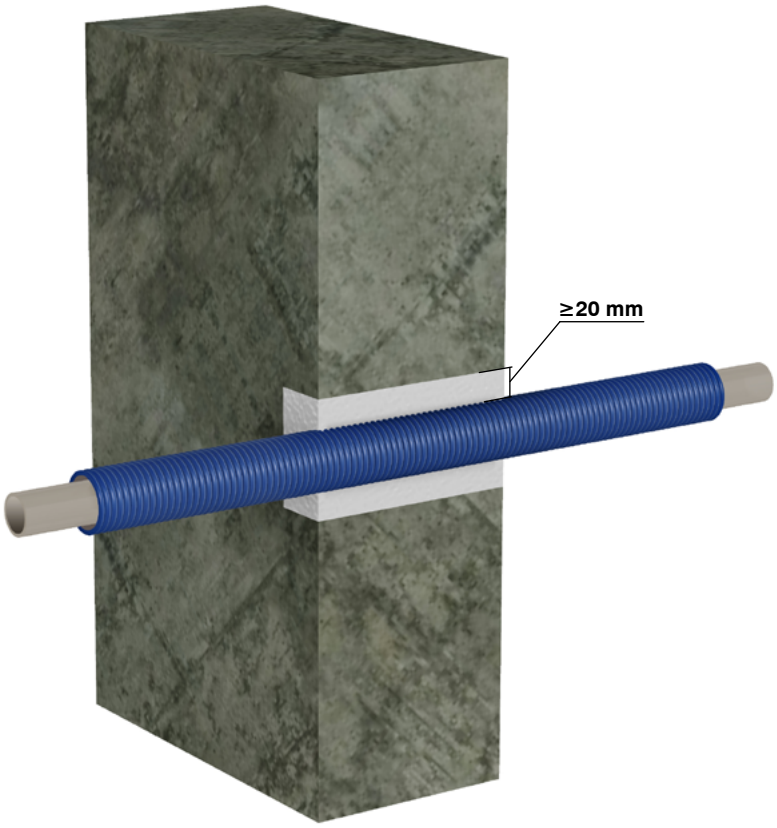
Table: 21

Fire resistance class E 240 / EI 240			
Rigid wall ≥ 150 mm. Single pipe penetrations			
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
PE-X plastic water pipes, made from PVC with inner pipe of PP: Ø ≤ 41,3 mm, wall thickness (t): 4,8 mm. C/C			
Uninsulated	GPG 150	Without backing	**26**

Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 150 mm. Distance between edge of penetration and pipe must be at least 20 mm.

Figure 26. Thickness of GPG 150 mm



Rigid wall ≥ 150 mm

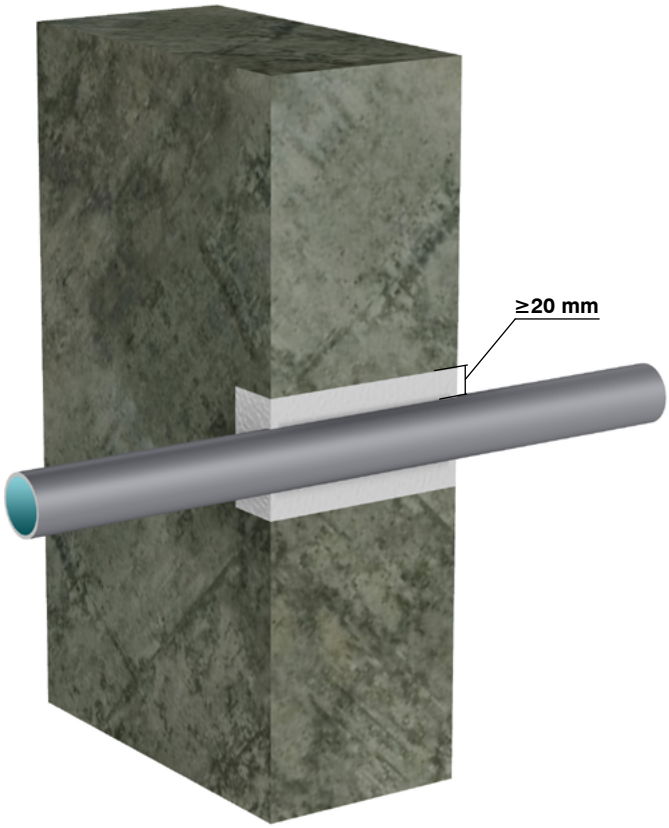
Table: 22

Fire resistance class E 240 / EI 240		
Rigid wall ≥ 150 mm. Single pipe penetrations		
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Figure**
Aluminium pipe Alu-PEX: ≤ Ø 32 mm, wall thickness (t): 2,25 mm. C/C		
Uninsulated	GPG 150	**27**
Aluminium pipe Alu-PEX: ≤ Ø 42 mm, wall thickness (t): 2,25 mm. C/C		
Uninsulated	GPG 150	**27**

Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 150 mm. Distance between edge of penetration and pipe must be at least 20 mm.

Figure 27. Thickness of GPG 150 mm



Rigid wall ≥ 150 mm

Table: 23

Fire resistance class E 240 / EI 120		
Rigid wall ≥ 150 mm. Single pipe penetrations		
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Figure**
Steel pipe: 40 mm≤ D ≤ 48 mm, wall thickness (t): 2,6 ≤ t ≤ 14,2 mm. C/C		
Uninsulated	GPG 150	**28**

Table: 24

Fire resistance class E 240 / EI 45		
Steel pipe: 49 mm≤ D ≤ 75 mm, wall thickness (t): 2,9 ≤ t ≤ 14,2 mm. C/C		
Uninsulated	GPG 150	**29**

Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 150 mm. Distance between edge of penetration and pipe must be at least 30 mm.

Figure 28. Thickness of GPG 150 mm

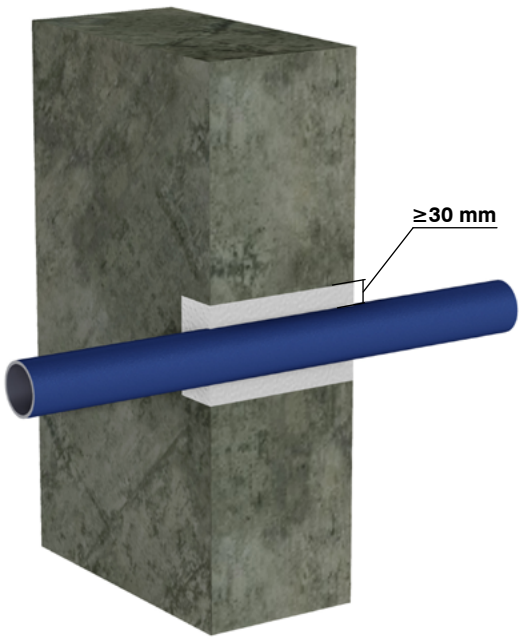
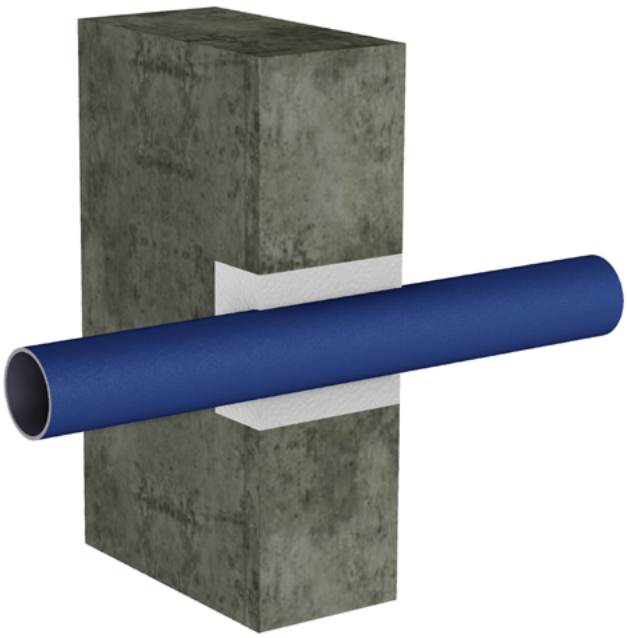


Figure 29. Thickness of GPG 150 mm



Rigid wall ≥ 150 mm

Table: 25

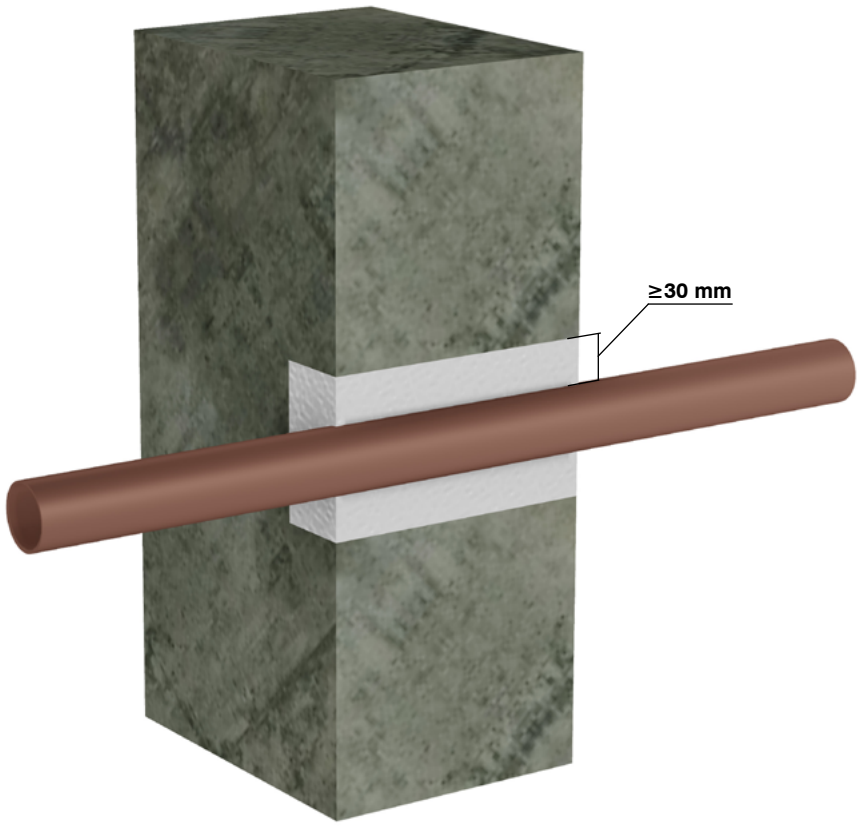
Fire resistance class E 240 / EI 30		
Rigid wall ≥ 150 mm. Single pipe penetrations		
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Figur**
Copper and steel pipe: Ø 35 mm, wall thickness (t):1,5 mm. C/C		
Uninsulated	GPG 150	**30**

Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 150 mm.

Distance between edge of penetration and pipe must be at least 30 mm.

Figure 30. Thickness of GPG 150 mm



Rigid wall ≥ 250 mm

Table: 26

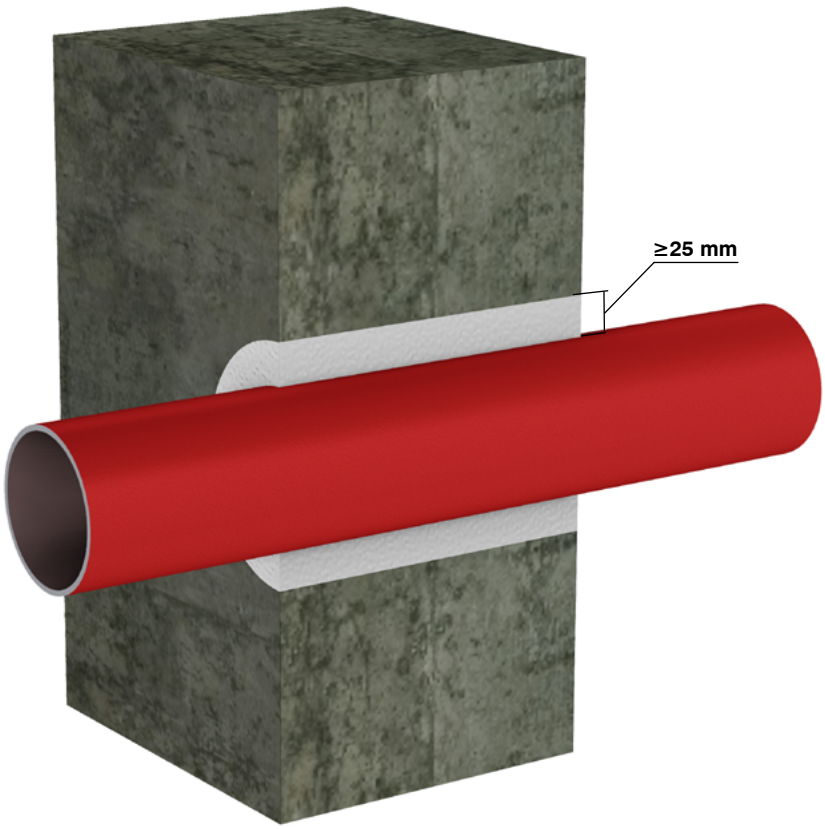
Rigid wall ≥ 250 mm. Single pipe penetrations			
Cast iron pipe: Ø 40 mm - Ø 58 mm, wall thickness (t): 3,5 ≥ 14,2 mm. U/C			**Fire resistance class E 240 / EI 240**
Cast iron pipe: Ø 59 mm - Ø 75 mm, wall thickness (t): 3,5 ≥ 14,2 mm. U/C			**Fire resistance class E 240 / EI 120**
Cast iron pipe: Ø 76 mm - Ø 110 mm, wall thickness (t): 3,5 ≥ 14,2 mm. U/C			**Fire resistance class E 240 / EI 60**
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Uninsulated	GPG 250	With or without backing of stone wool	**31**

Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 250 mm.

Distance between edge of penetration and pipe must be at least 25 mm.

Figure 31. Thickness of GPG 250 mm



Rigid wall ≥ 250 mm

Table: 27

Rigid wall ≥ 250 mm. Small pipe penetrations 150 x 355 mm			
Cast iron pipe: Ø 40 mm - Ø 58 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 240**
Cast iron pipe: Ø 59 mm - Ø 75 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 120**
Cast iron pipe: Ø 76 mm - Ø 110 mm, wall thickness (t): 3,5 ≤ t ≤ 14,2 mm. U/C			**Fire resistance class E 240 / EI 90**
Pipe insulation: Type, density	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Uninsulated	GPG 250	With or without backing of stone wool	**32**

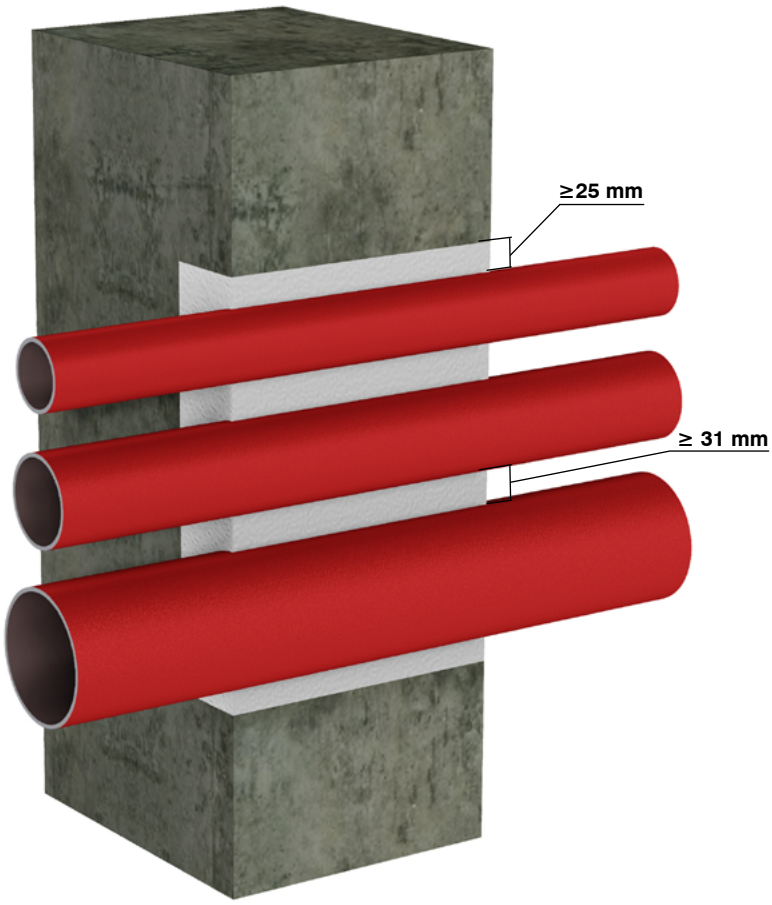
Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 250 mm.

Distance between edge of penetration and pipe must be at least 25 mm.

Distance between the pipes in the same penetration must be at least 31 mm.

Figure 32. Thickness of GPG 250 mm



Flexible and Rigid wall ≥ 100 mm

Table: 28

Fire resistance class E 120 / EI 120				
Flexible and Rigid wall ≥ 100 mm. Large pipe penetrations ≤ 1000 x 1000 mm				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter(D): 40 ≤ D ≤ 42 mm, wall thickness (t): 2,6 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	20, 1150, LS	GPG 40	Stone wool 150 kg/m3, 20	**33**
ULTIMATE 80 kg/m3	20, 1150, LS	GPG 40	Stone wool 150 kg/m3, 20	

Installation

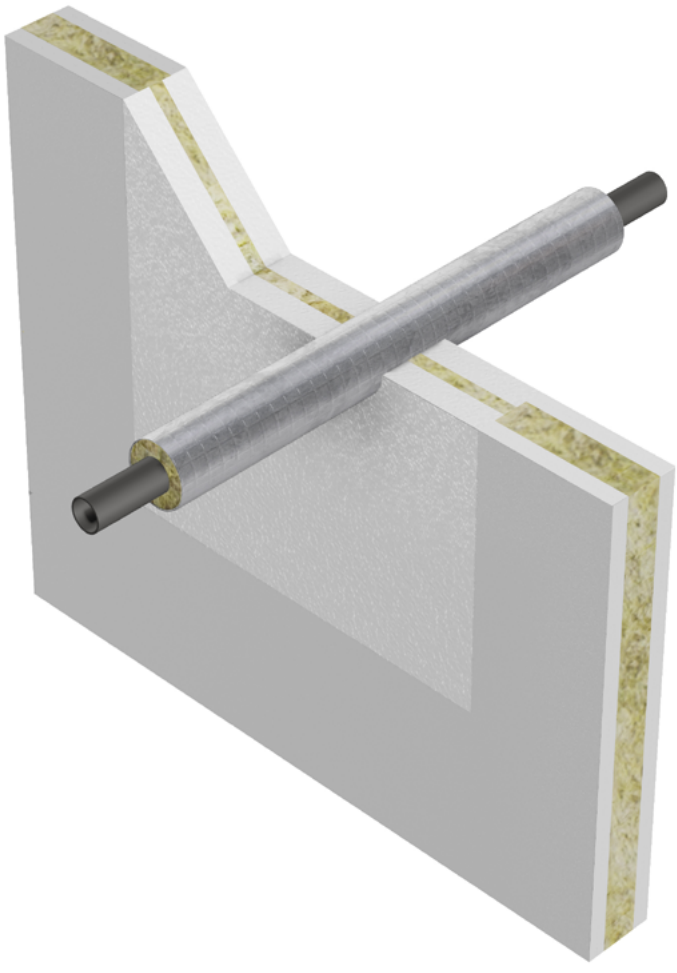
LS: Specified insulation locally with specified length out from the wall on both sides and through the penetration.

Distance between the pipes must be at least 30 mm.

Large apertures are insulated with 20 mm of stone wool, density 150kg/m³. The stone wool insulation must fit tightly.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG is applied flush with the wall on both sides.

Figure 33. Thickness of GPG 2 x 40 mm. Continuous pipe insulation 20 mm thick, with 1150 mm extending out on each side of the wall



Flexible and Rigid wall ≥ 100 mm

Table: 29

Fire resistance class E 120 / EI 120				
Flexible and Rigid wall ≥ 100 mm. Single pipe penetrations				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter(D): 40 ≤ D ≤ 42 mm, wall thickness (t): 2,6 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	20, 550, LS	GPG 30	Stone wool 40 kg/m3, 40	**34**
* **Glass wool** 75 kg/m3	40, 600, LI	GPG 30	Stone wool 40 kg/m3,40	**35**
ULIMATE 80 kg/m3	20, 550, LS	GPG 30	Stone wool 40 kg/m3, 40	**36**
Steel pipe: Diameter(D): 42 ≤ D ≤ 168,3 mm, wall thickness (t): 4,5 ≤ t ≤ 14,2 mm. U/C				
ULTIMATE 80 kg/m3	30, 1150, LS	GPG 30	Stone wool 40 kg/m3, 40	**37**
PE-X plastic water pipes 2 x d ≤ 32 mm.				
Uninsulated	Uninsulated	GPG 100	Without backing	**38**

Installation

LS: Specified insulation locally with specified length out from the wall on both sides and through the penetration.
See **figures 34, 36 and 37.**

LI: Specified insulation locally with specified length from the wall/floor on both sides, but interrupted through the penetration.
See **figure 35.**

Penetrations must be carefully filled with loose stone wool in the density and thickness as described in the tables above.

Plastic pipe type PE-X: If there are several pipes in the same aperture, the distance between the pipes must be at least 15 mm.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG is applied flush with the wall on both sides.

Figure 34. Thickness of GPG 30 mm from both sides. Continuous pipe insulation 20 mm thick, with 550 mm extending out on each side of the wall

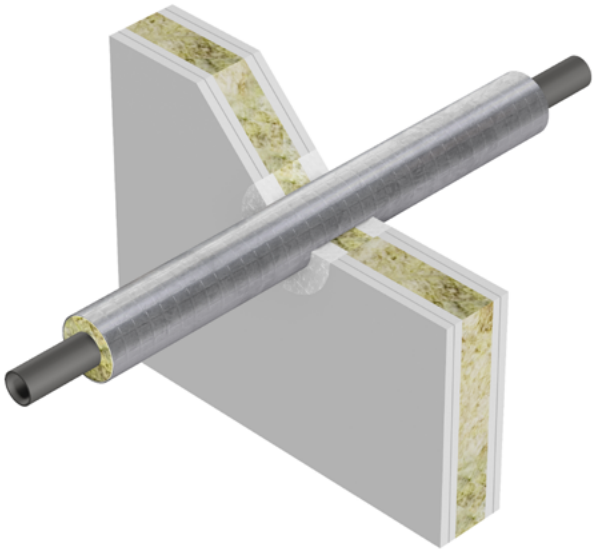
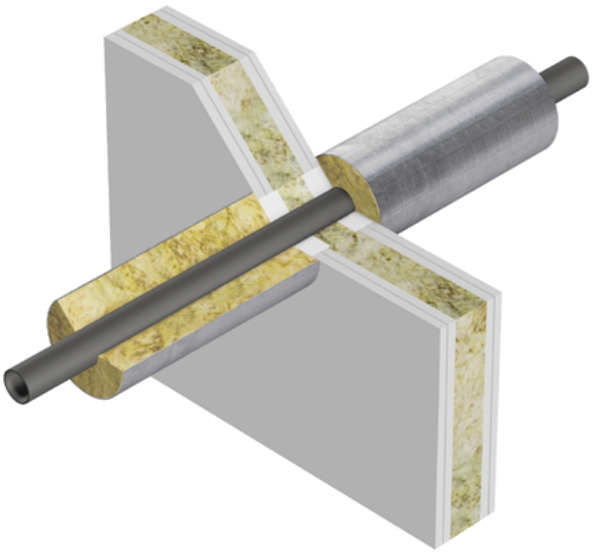


Figure 35. Thickness of GPG 30 mm from both sides. Interrupted pipe insulation of glass wool 40 mm thick, with 600 mm extending out on each side of the wall



* Pipe insulation type glass wool ISOVER ClimPipe Section Alu2, glass wool with density 75 kg/m3. Fire class $A2_L$-s1, d0.

Flexible and Rigid wall ≥ 100 mm

Figure 36. Thickness of GPG 30 mm from both sides. Continuous ULTIMATE pipe insulation 20 mm thick, with 550 mm extending out on each side of the wall

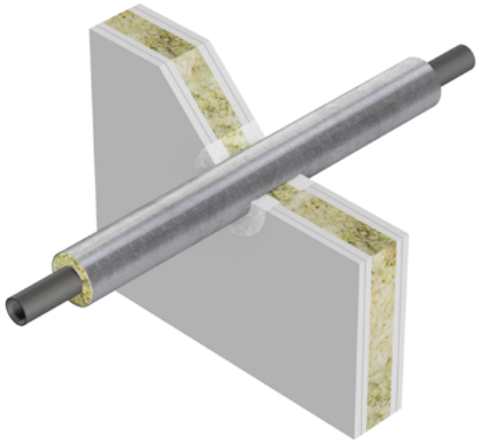


Figure 37. Thickness of GPG 30 mm from both sides. Continuous ULTIMATE pipe insulation 30 mm thick, with 1150 mm extending out on each side of the wall

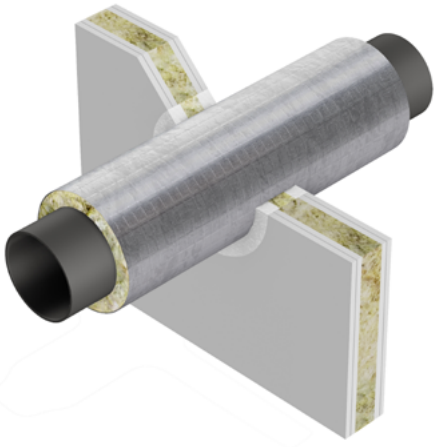
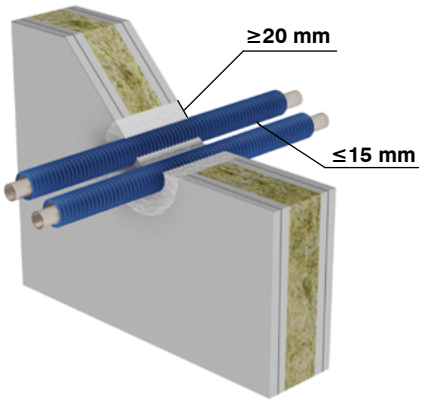


Figure 38. PE-X plastic water pipes 2 x d ≤ 32 mm. Thickness of GPG 100 mm



Flexible and Rigid wall ≥ 100 mm

Table: 30

Fire resistance class E 120 / EI 90				
Flexible and Rigid wall ≥ 100 mm. Large pipe penetrations ≤ 1000 x 1000 mm				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Steel pipe: Diameter(D): 42 ≤ D ≤ 219 mm, wall thickness (t): 4,5 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	30, 1150, LS	GPG 40	Stone wool 150 kg/m3, 20	**39**

Installation

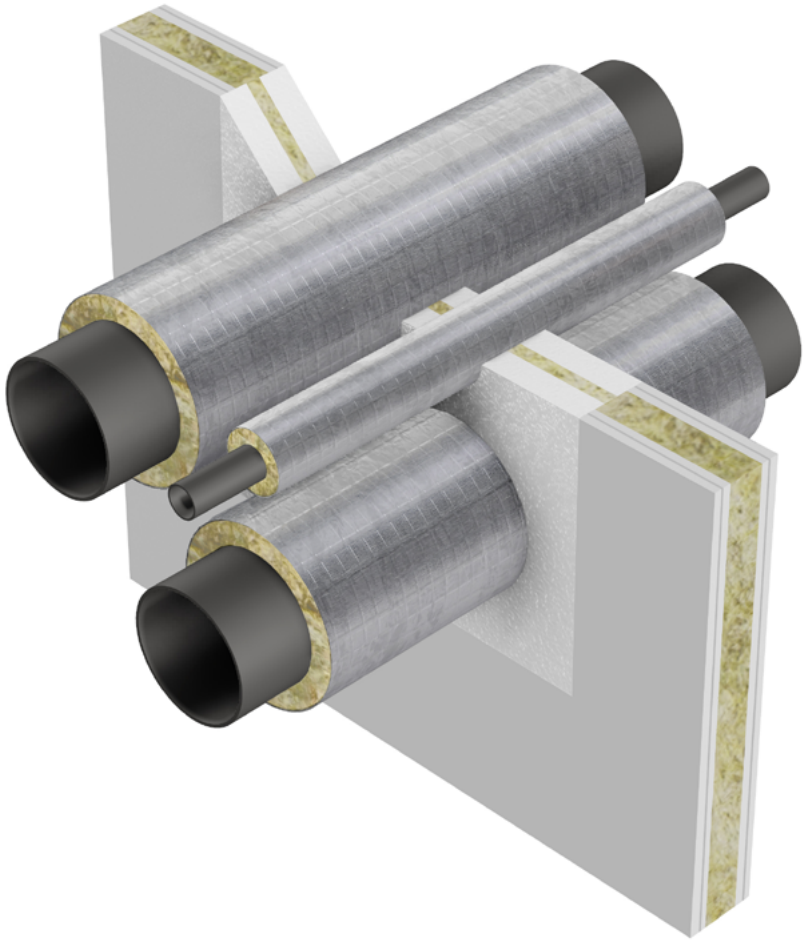
LS: Specified insulation locally with specified length out from the wall on both sides and through the penetration.

Distance between the pipes must be at least 30 mm.

Large apertures are insulated with 20 mm of stone wool, density 150kg/m^3. The stone wool insulation must fit tightly.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG is applied flush with the wall on both sides.

Figure 39. Thickness of GPG 40 mm from both sides. Continuous pipe insulation 30 mm thick, with 1150 mm extending out on each side of the wall



Flexible and Rigid wall ≥ 130 mm

Table: 31

Fire resistance class E 240 / EI 240				
Flexible and Rigid wall ≥ 130 mm. Single pipe penetrations				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm)**	**Additional product**	**Figure**
Copper and steel pipe: Ø 12 mm - Ø 18 mm, wall thickness (t): 1,0 mm. U/C				
* **Glass wool** 75 kg/m3	20, Fully insulated, CS	GPG 130	1 layer FS Wrap LX	**40**
Copper and steel pipe: Ø 22 mm - Ø 54 mm, wall thickness (t): 1,0 ≤ t ≤ 1,5. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 130	2 layers FS Wrap LX	**40**

Table: 32

Fire resistance class E 240 / EI 180				
Copper and steel pipe: Ø 40 mm - Ø 54 mm, wall thickness (t): 1,5 ≤ t ≤ 14,2 mm. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 130	2 layers FS Wrap LX	**40**

Table: 33

Fire resistance class E 240 / EI 120				
Copper and steel pipe: Ø 54 mm - Ø 76 mm, wall thickness (t): 2,0 ≤ t ≤ 14,2 mm. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 130	3 layers FS Wrap LX	**40**

Installation

CS: Specified insulation is continuous through the entire length of the pipe, including the penetration.

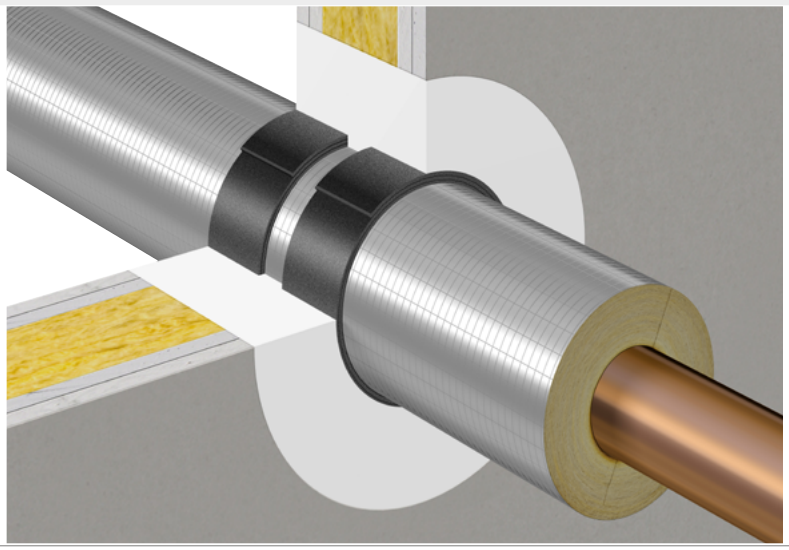
FIRESAFE Wrap LX is mounted on pipe around pipe insulation flush with the wall on both sides with the number of layers as described in the tables above.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 130 mm, flush with the wall on both sides.

Distance between edge of penetration and pipe must be at least 24 mm (Including Wrap).

FIRESAFE Wrap LX is applied on both sides of the wall flush the fire sealant. Wrap LX shall be visible in the GPG sealant after fire sealing is completed.

Figure 40. Thickness of GPG 130 mm



* Pipe insulation type glass wool ISOVER ClimPipe Section Alu2, glass wool with density 75 kg/m3. Fire resistance class $A2_L$-s1, d0.

Flexible and Rigid wall ≥ 130 mm

Table: 34

Fire resistance class E 240 / EI 240				
Flexible and Rigid wall ≥ 130 mm. Large pipe penetrations 1000 x 800 mm				
Pipe insulation: Type, density	**Pipe insulation: Thickness (mm), length (mm), distribution**	**Thickness of GPG (mm)**	**Additional product**	**Figure**
Copper and steel pipe: Ø 12 mm - Ø 18 mm, wall thickness (t): 1,0 mm. U/C				
* **Glass wool** 75 kg/m3	20, Fully insulated, CS	GPG 130	1 layer FS Wrap LX	**41**
Copper and steel pipe: Ø 22 mm - Ø 54 mm, wall thickness (t): 1,0 ≤ t ≤ 1,5. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 130	2 layers FS Wrap LX	**41**

Table: 35

Fire resistance class E 240 / EI 180				
Copper and steel pipe: Ø 40 mm - Ø 54 mm, wall thickness (t): 1,5 ≤ t ≤ 14,2 mm. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 130	2 layers FS Wrap LX	**41**

Table: 36

Fire resistance class E 240 / EI 120				
Copper and steel pipe: Ø 54 mm - Ø 76 mm, wall thickness (t): 2,0 ≤ t ≤ 14,2 mm. U/C				
* **Glass wool** 75 kg/m3	30, Fully insulated, CS	GPG 130	3 layers FS Wrap LX	**41**

Installation

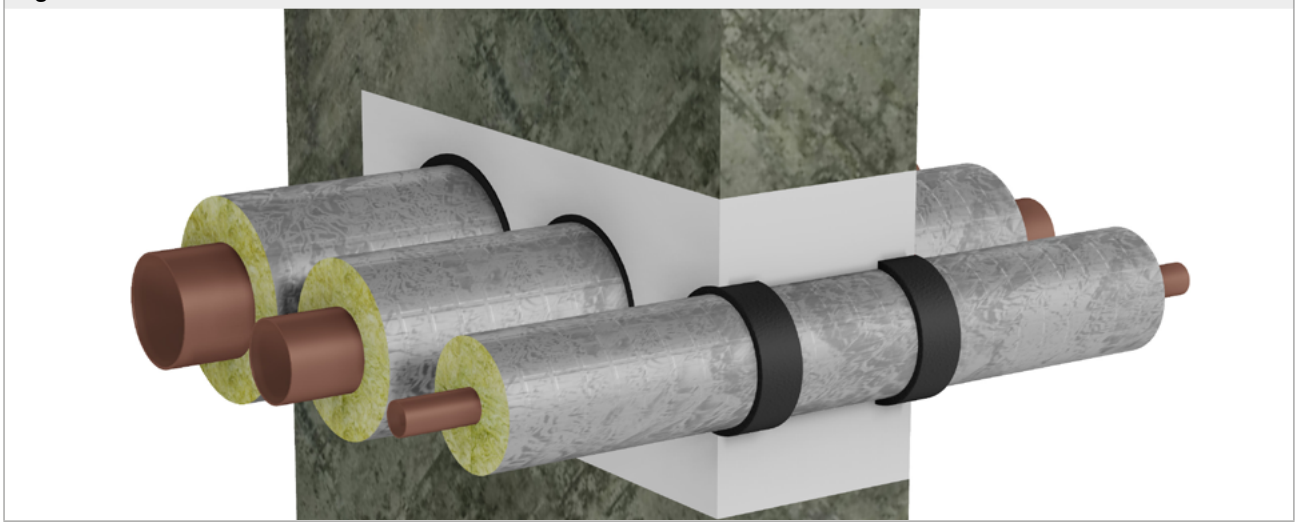
CS: Specified insulation is continuous through the entire length of the pipe, including the penetration.

FIRESAFE Wrap LX is mounted on pipe around pipe insulation flush with the wall on both sides with the number of layers as described in the tables above.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG mortar is applied to a thickness of 130 mm, flush with the wall on both sides.
Distance between edge of penetration and pipe must be at least 22 mm (Including Wrap).
Distance between the pipes in the same penetration must be at least 22 mm (Including Wrap).

FIRESAFE Wrap LX is applied on both sides of the wall flush the fire sealant. Wrap LX shall be visible in the GPG sealant after fire sealing is completed.

Figure 41. Thickness of GPG 130 mm



* Pipe insulation type glass wool ISOVER ClimPipe Section Alu2, glass wool with density 75 kg/m3. Fire resistance class $A2_L$-s1, d0.

Mixed installation penetrations

All technical installations can run through the same aperture provided compliance with the requirements of GPG sealant thickness in relation to the Fire resistance class for each individual installation. There is no requirement for spacing between cables or the distance from cables to the edge of the aperture, cables can lie right next to each other. All types of continuous cable trays/cable ladders of steel and bundles in the same penetration. The distance between pipes should be 20–30 mm to ensure compliance with requirements for sealant thickness between the pipes. The pipe can be at any angle between 90° and 45° to the wall or the floor. All solutions in the tables for mixed penetrations can be used for single penetrations, provided the same sealant thickness of GPG is used.

Explanations of abbreviations for pipe insulation (ref. 1366-3: 2009, Table 1):

CS: Specified insulation is continuous through the entire length of the pipe, including the penetration.

LS: Specified insulation locally with specified length out from the wall/floor on both sides and through the penetration.

LI: Specified insulation locally with specified length from the wall/floor on both sides, but interrupted through the penetration.

Tested solutions for insulating pipes were executed such that all possible variations were covered (ref. 1366-3: 2009):

LI: Pipe insulation is interrupted in the penetration. Installations with glass wool pipe insulation can also use pipe insulation of stone wool or ceramic fibre.

LS: Specified insulation with specified length out from the wall/floor on both sides and through the penetration. Installations with ULTIMATE can also use pipe insulation of stone wool or ceramic fibre.

CS: Specified insulation is continuous through the entire length of the pipe, including the penetration. Installations using cellular rubber can also use steel and copper pipes with FS Wrap LX as an additional product.

CS – **LS** – **LI:** Thickness and density of the pipe insulation in the tables can be increased but not decreased.

CS – LS – LI: Lengths of pipe insulation can be increased but not decreased.

Explanations of abbreviations for pipe end configuration in test (ref. NS-EN 1366-3: 2009, Table 2):

U/C: Uncapped/Capped, non-ventilated pipe systems e.g. cold and hot water pipes.

U/U: Uncapped/Uncapped, ventilated pipe systems e.g. waste water and rain water pipes.

C/C: Capped/capped. Capped/Capped Capped pipe systems with permanent water pressure e.g. sprinkler pipes.

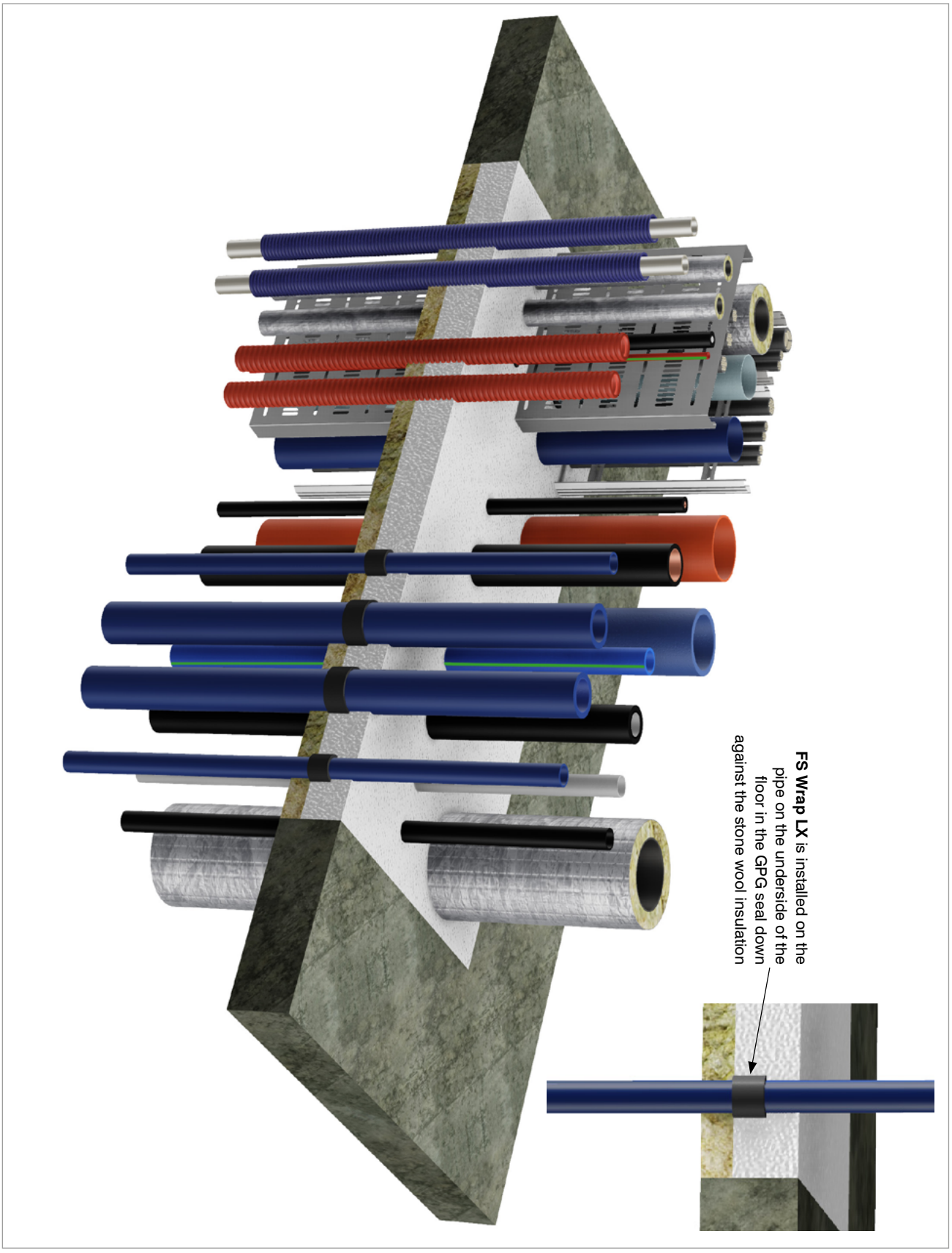
(t): Wall thickness (t) is the thickness of pipes.

/ For fire resistance class and installation details, see tables:

Table	Type of penetration	Figure	Fire resistance class	Page
1	Rigid floor ≥ 150 mm. Metal pipe or mixed penetrations ≤ 1800 x 900 mm.	1-2	E 120 / EI 120	**50-51**
2	Rigid floor ≥ 150 mm. Plastic pipe or mixed penetrations ≤ 1800 x 900 mm.	3	E 90 / EI 90	**52**
3	Flexible and Rigid wall ≥ 100 mm. Metal pipe or mixed penetrations ≤ 1200 x 1200 mm.	4-5	E 90 / EI 90	**53-54**
4	Flexible and Rigid wall ≥ 100 mm. Plastic pipe or mixed penetrations ≤ 1200 x 1200 mm.	6	E 90 / EI 60	**55**

Rigid floor ≥ 150 mm

Combustible and non combustible pipes
Illustration Mixed installation penetrations



Rigid floor ≥ 150 mm

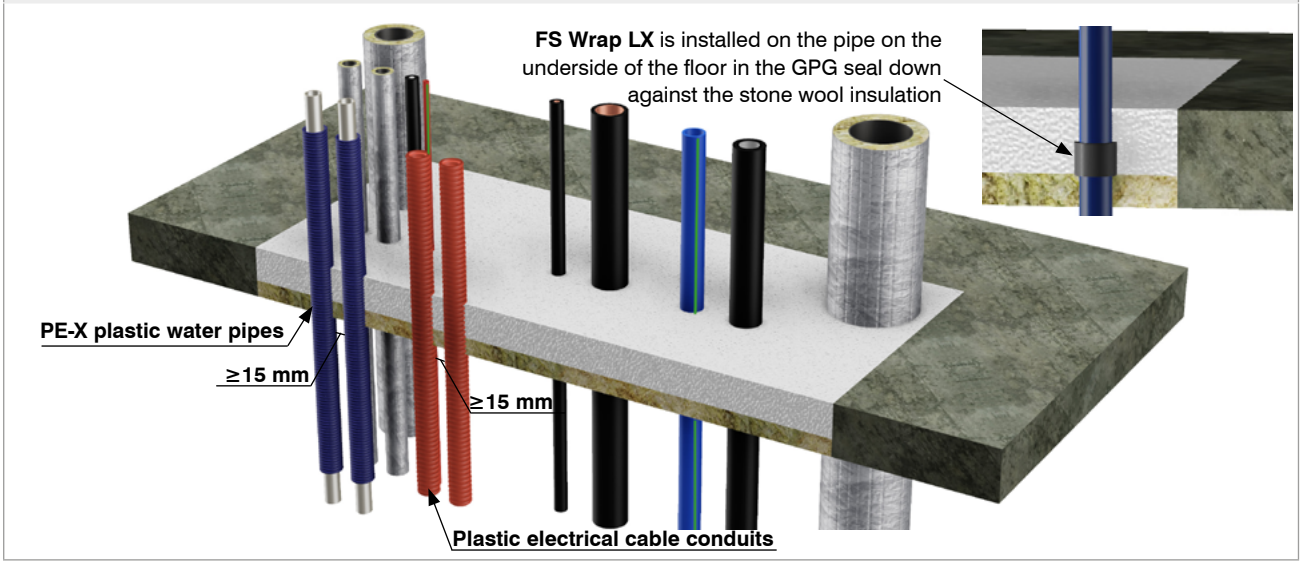
Table: 1

Fire resistance class E 120 / EI 120				
Rigid floor ≥ 150 mm. Large pipe penetrations or mixed ≤ 1800 x 900 mm				
Pipe insulation: Type, density	**Pipe insulation:Thickness mm, length mm, distribution**	**Thickness of GPG (mm) flush with the top of the floor**	**Backing, type, density, thickness (mm)**	**Additional product**
Steel pipe: Diameter (D): 42 ≤ D ≤ 219 mm, wall thickness (t): 3,2 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	30, 1150, LS	GPG 100	Stone wool 150 kg/m3, 50	
ULITIMATE 80 kg/m3	30, 1150, LS	GPG 100	Stone wool 150 kg/m3, 50	
Steel pipe: Diameter (D): 40 ≤ D ≤ 42 mm, wall thickness (t): 2,6 ≤ t ≤ 14,2 mm. U/C				
Stone wool 85 kg/m3	20, 1150, LS	GPG 100	Stone wool 150 kg/m3, 50	
ULITIMATE 80 kg/m3	20, 1150, LS	GPG 100	Stone wool 150 kg/m3, 50	
Steel pipe: Diameter (D): 40 ≤ D ≤ 168,3 mm, wall thickness (t): 2,0 ≤ t ≤ 14,2 mm. U/C				
Stone wool 100 kg/m3	40, Fully insulated, CS	GPG 100	Stone wool 150 kg/m3, 50	
Copper and steel pipe: Diameter (D): 15 ≤ D ≤ 76 mm, wall thickness (t): 1,0 ≤ t ≤ 14,2 mm				
Cellular rubber	12, Fully insulated, CS	GPG 100	Stone wool 150 kg/m3, 50	1 layer FS Wrap LX
Aluminium pipe Alu-PEX: Diameter (D): 16 ≤ D ≤ 63 mm, wall thickness (t): 2,25 ≤ t ≤ 4,5 mm. U/C				
Cellular rubber	12, Fully insulated, CS	GPG 100	Stone wool 150 kg/m3, 50	1 layer FS Wrap LX
Climatherm-faser OT SDR 11 pipe: Diameter = 20 mm wall thickness (t)= 2,8 mm				
Uninsulated		GPG 100	Stone wool 150 kg/m3, 50	2 layers FS Wrap LX
Climatherm-faser OT SDR 11 pipe: Diameter (D): 20 < D ≤ 63 mm, wall thickness (t): 2,8 < t ≤ 5,8 mm. U/C				
Uninsulated		GPG 100	Stone wool 150 kg/m3, 50	3 layers FS Wrap LX
PE-X plastic water pipes 2 x ≤ 32 mm. C/C				
Uninsulated		GPG 100		
Plastic electrical cable conduits 2 x ≤ 32 mm. C/C				
Uninsulated		GPG 100		

Installation

The table above is for mixed penetrations with insulated steel, copper and aluminium pipes. Uninsulated fibreglass climatherm pipe or equivalent Fire resistance class EI 120. Pipe-in-pipe PE-X and electrical conduits ≤ 32 mm. The aperture is insulated with 50 mm stone wool, density 150 kg/m3. The stone wool insulation must fit tightly. Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly. For steel, copper and aluminium pipes insulated with cellular rubber, FS Wrap LX is applied around cellular rubber with the number of layers of FS Wrap LX as shown in the table above. FS Wrap LX is installed on the underside of the floor in the GPG seal down against the stone wool insulation. See example detail, **figure 1.**

Figure 1. Thickness of GPG 100 mm



Rigid floor ≥ 150 mm

Table: 2

Fire resistance class E 90 / EI 90				
Rigid floor ≥ 150 mm. Large pipe penetrations or mixed ≤ 1800 x 900 mm.				
Pipe insulation: Type, density	**Diameter Ø Wall thickness (mm)**	**Thickness of GPG (mm) flush with the top of the floor**	**Backing, type, density, thickness (mm)**	**Additional product**
* PP Wavin Asto	Ø110 /4,8	GPG 100	Stone wool 150 kg/m3, 50	6 layers FS Wrap LX, U/U
* PE	Ø50 / 2	GPG 100	Stone wool 150 kg/m3, 50	3 layer FS Wrap LX, U/U
* PP	Ø160 / 5,5	GPG 100	Stone wool 150 kg/m3, 50	6 layers FS Wrap LX, U/U
* PP	Ø50 / 2	GPG 100	Stone wool 150 kg/m3, 50	3 layers FS Wrap LX, U/U
** PP Blue Power	Ø110 /5	GPG 100	Stone wool 150 kg/m3, 50	6 layers FS Wrap LX, U/U
** PP Blue Power	Ø75 / 2,3	GPG 100	Stone wool 150 kg/m3, 50	3 layers FS Wrap LX, U/U
** PP Blue Power	Ø50 / 1,8	GPG 100	Stone wool 150 kg/m3, 50	2 layers FS Wrap LX, U/U
** PP Pipelife Stilla	Ø160 / 5,4	GPG 100	Stone wool 150 kg/m3, 50	4 layers FS Wrap LX, U/C
** PP Pipelife Stilla	Ø75 / 2,6	GPG 100	Stone wool 150 kg/m3, 50	3 layers FS Wrap LX, U/C
** PP Pipelife Stilla	Ø50 /1,8	GPG 100	Stone wool 150 kg/m3, 50	2 layers FS Wrap LX, U/C

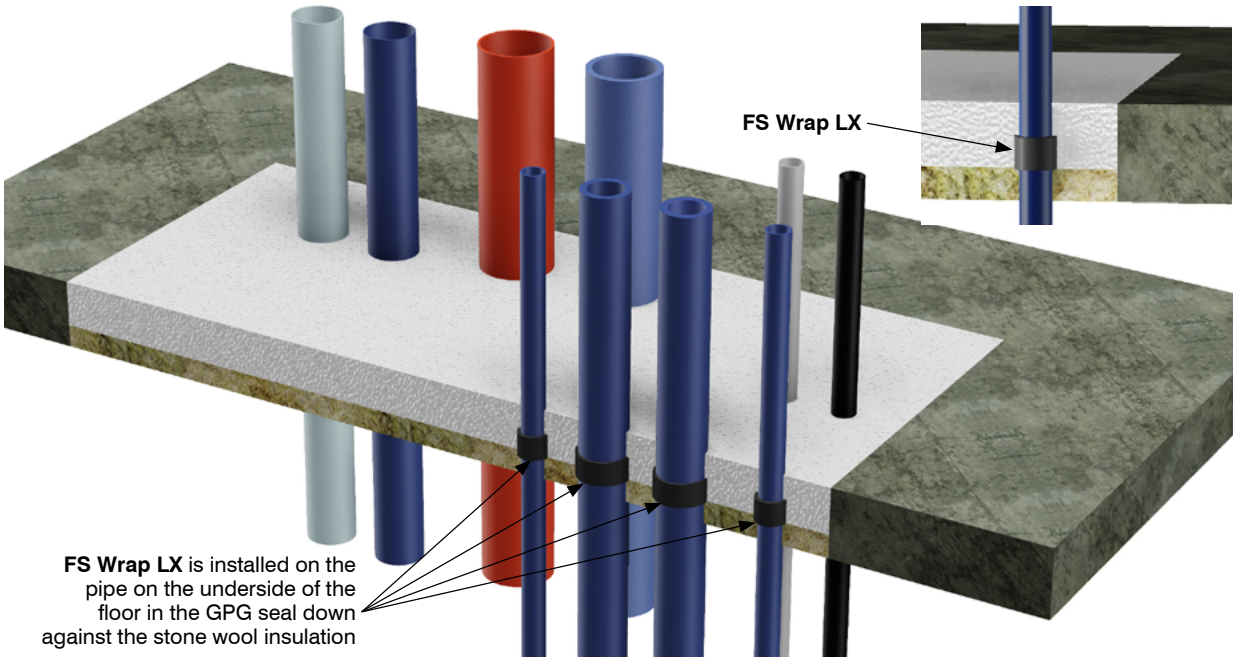
Installation

The table above is for penetrations with plastic pipes and can be mixed with all types of penetrations corresponding to Fire resistanse class EI 90.

The aperture is insulated with 50 mm stone wool, density 150 kg/m^3. The stone wool insulation must fit tightly. Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly. FS Wrap LX is applied around plastic pipes with the number of layers as indicated in the table above. FS Wrap LX is installed on the pipe on the underside of the floor in the GPG seal, FS Wrap LX should be directly against the stone wool insulation.

GPG mortar is mixed to a fluid consistency with 2 parts GPG and 1 part water. GPG is applied flush with the top of the floor. FS Wrap LX is installed on the pipe on the underside of the floor in the GPG seal down against the stone wool insulation. See example detail, **figure 2.**

Figure 2. Thickness of GPG 100 mm



* All solutions for PP-PE also apply to PVC pipes.

** All solutions PP Blue Power and PP Pipelife Stilla also apply to other PP multilayer pipes.

Flexible and Rigid wall ≥ 100 mm

Combustible and non combustible pipes

Illustration Mixed installation penetrations

Flexible and Rigid wall ≥ 100 mm

Table: 3

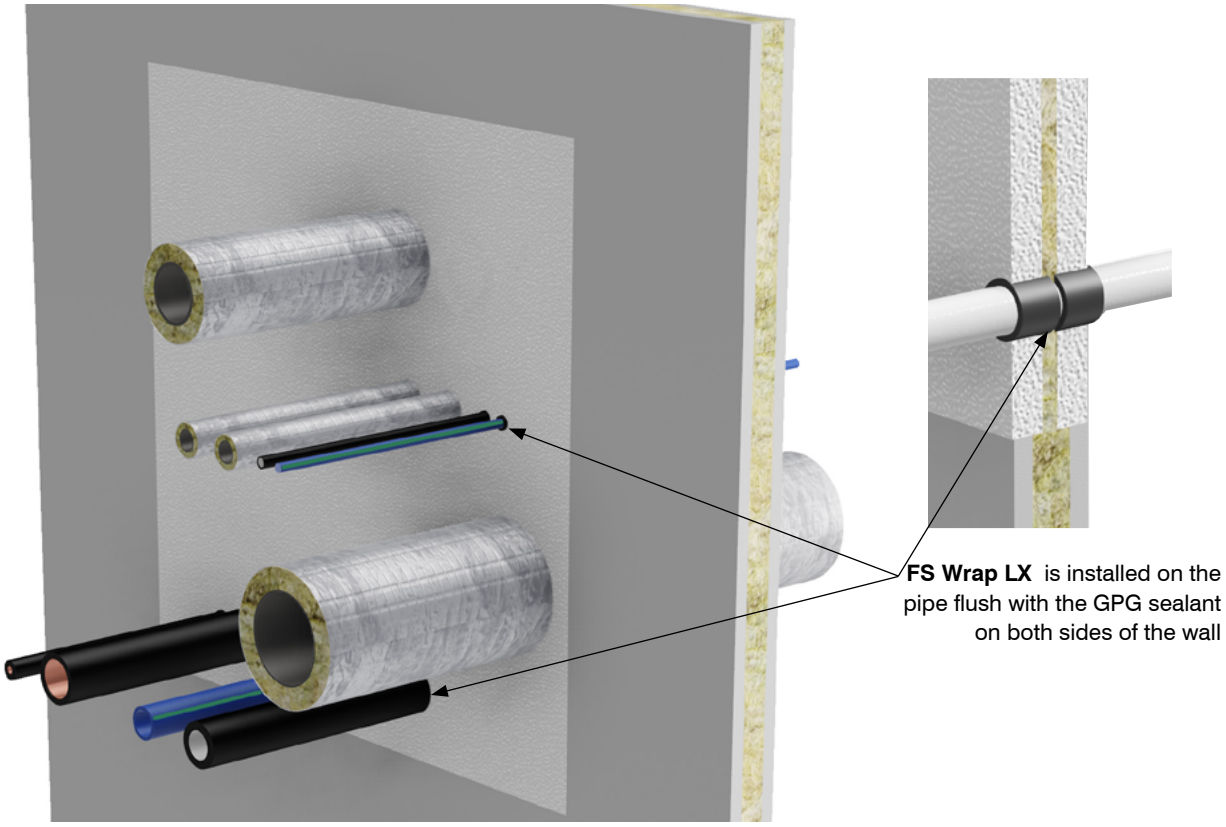
Fire resistance class E 90 / EI 90				
Flexible and Rigid wall ≥ 100 mm. Large pipe penetrations or mixed ≤ 1200 x 1200 mm				
Pipe insulation, type, density	**Pipe insulation, thickness, length (mm), distribution**	**Thickness of GPG both sides (mm)**	**Backing, type, density, thickness (mm)**	**Additional product both sides**
Steel pipe: Diameter(D): 40 ≤ D ≤ 168,3 mm, wall thickness (t): 2,0 ≤ t ≤ 14,2 mm. U/C				
Stone wool 100 kg/m3	40, Fully insulated, CS	GPG 40	Stone wool 150 kg/m3, 20	
Copper and steel pipe: Diameter (D): 15 ≤ D ≤ 76 mm, wall thickness (t): 1,0 ≤ t ≤ 14,2 mm. U/C				
Cellular rubber	12, Fully insulated, CS	GPG 40	Stone wool 150 kg/m3, 20	1 layer FS Wrap LX
Aluminium pipe Alu-PEX: Diameter (D): 16 ≤ D ≤ 63 mm, wall thickness (t): 2,25 ≤ t ≤ 4,5 mm. U/C				
Cellular rubber	12, Fully insulated, CS	GPG 40	Stone wool 150 kg/m3, 20	1 layer FS Wrap LX
Climatherm-faser OT SDR 11 pipe: Diameter = 20 mm, wall thickness t= 2,8 mm. U/C				
Uninsulated		GPG 40	Stone wool 150 kg/m3, 20	2 layers FS Wrap LX
Climatherm-faser OT SDR 11 pipe: Diameter (D): 20 < D ≤ 63 mm, wall thickness (t): 2,8 < t ≤ 5,8 mm. U/C				
Uninsulated		GPG 40	Stone wool 150 kg/m3, 20	3 layers FS Wrap LX

Installation

The aperture is insulated with 20 mm stone wool, density 150 kg/m^3. The stone wool insulation must fit tightly.
Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly. FS Wrap LX is applied around pipes with the number of layers as indicated in the table above. FS Wrap LX is installed on the pipe flush with the GPG sealant on both sides of the wall.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG is applied flush with the wall on both sides. See example detail, **figure 3.**

Figure 3. Mixed penetration ≤ 1200 x 1200 mm. Thickness of GPG 2x40 mm



Flexible and Rigid wall ≥ 100 mm

Table: 4

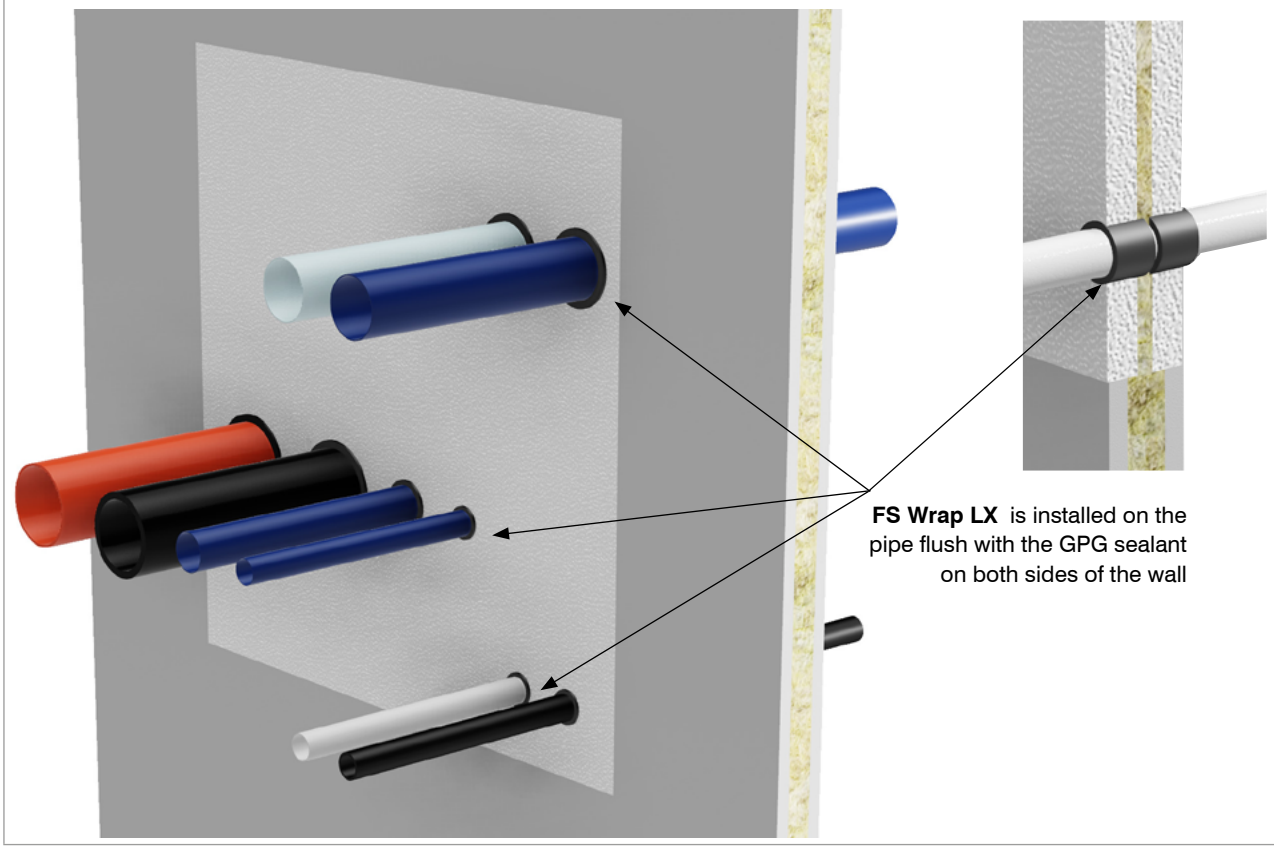
Fire resistance class E 90 / EI 60				
Flexible and Rigid wall ≥ 100 mm. Large pipe penetrations with plastic pipes or mixed ≤ 1200 x 1200 mm				
Plastic pipe type	**Diameter Ø Wall thickness (mm)**	**Thickness of GPG both sides (mm)**	**Backing, type, density, thickness (mm)**	**Additional product both sides**
* PP Wavin Asto	Ø110/4,8	GPG 40	Stone wool 150 kg/m3, 20	6 layers FS Wrap LX, U/U
* PE	Ø50/2	GPG 40	Stone wool 150 kg/m3, 20	3 layers FS Wrap LX, U/U
* PE	Ø160/14	GPG 40	Stone wool 150 kg/m3, 20	6 layers FS Wrap LX, U/U
* PP	Ø160/5,5	GPG 40	Stone wool 150 kg/m3, 20	6 layers FS Wrap LX, U/U
* PP	Ø50/2	GPG 40	Stone wool 150 kg/m3, 20	3 layers FS Wrap LX, U/U
** PP Blue Power	Ø110/5	GPG 40	Stone wool 150 kg/m3, 20	6 layers FS Wrap LX, U/U
** PP Blue Power	Ø75/2,3	GPG 40	Stone wool 150 kg/m3, 20	3 layers FS Wrap LX, U/U
** PP Blue Power	Ø50/1,8	GPG 40	Stone wool 150 kg/m3, 20	2 layers FS Wrap LX, U/U

Installation

The aperture is insulated with 20 mm stone wool, density 150 kg/m³. The stone wool insulation must fit tightly.
Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly. FS Wrap iLX s applied around pipes with the number of layers as indicated in the table above. FS Wrap LX is installed on the pipe flush with the GPG sealant on both sides of the wall.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG is applied flush with the wall on both sides. See example detail, **figure 4.**

Figure 4. Mixed penetrations ≤ 1200 x 1200 mm. Thickness of GPG 2x40 mm



* All solutions for PP-PE also apply to PVC pipes.

** All solutions PP Blue Power also apply to other PP multilayer pipes.

Cable conduits

Firesafe circular and square cable conduits are made of powder-coated steel, coated internally with an intumescent laminate that quickly closes the penetration in the event of a fire.

KL - reserve is made of plastic, type PVC, coated externally on each end with a heat expanding laminate, which quickly closes penetration of cables in case of a fire.

Firesafe cable conduits and KL - reserve is used as a reserve pipe for pulling cable in combination with FIRESAFE GPG MORTAR. The cable conduit can be used with all types of electric cable and telecom cables with a diameter of ≤ 21 mm. Or it can remain empty for later use.

Firesafe cable conduit can be used with a plastic electrical cable conduits with a diameter of ≤ 32 mm.

The cable conduit can be filled with many cables or plastic conduits assuming there is room for the requisite smoke seal inside the conduit. The cable conduit must not be left open without a smoke seal, as this can result in smoke during a fire.

Steel square cable conduits have a cold smoke seal of 20 mm stone wool in each end of the conduit. A smoke seal of cellular rubber in the square cable conduit can be easily made to fit the opening with a knife or scissors after the cables or plastic conduit pipe have be run through the conduit. (Installed at each end of the cable conduit). Square cable conduits have a detachable cap positioned longitudinally, which can be used on existing cables or plastic conduits in the penetration.

Separable steel square cable conduits is available in standard sizes: 65 x 65 and 95 x 95 mm with length 150 - 250 - 400 mm.

Steel circular cable conduits must be smoke sealed with stone wool inside. In the conduit, there is a bag of stone wool that is removed when pulling cable. After the cables or plastic conduits have been run through the conduit, the conduit is filled with as much stone wool as will fit. (Installed in the middle of the cable conduit, with 100mm stone wool). Firesafe steel circular cable conduits is available in standard sizes (d): Ø 30, Ø 50 og Ø 70 mm with length 330 mm.

KL - reserve has a cold smoke seal of 30 mm in the center of the conduit. Before installing cable in KL-reserve, make a hole in the 30 mm thick smoke seal inside the cable conduit. This is easily done with a drill for wood or steel. This drilled hole in the smoke seal should be maximum 2 mm larger than the cable diameter. Then pull the cable through the cable conduit. KL - reserve can be filled with many cables assuming there is room for the requisite smoke seal inside the conduit. KL - reserve is available in standard sizes (d): Ø 32 and Ø 50 mm with length 130 - 150 - 200 - 300 mm.

The cable conduit is mounted in the GPG seal in the wall/slab so that it protrudes evenly on each side.

All cable conduits installed in multiple penetrations can be used as a single penetration provided the same sealant thickness of GPG is used, but not vice versa.

The distance from the edge of the aperture to the conduit and the distance between the cable conduits should be minimum 20 mm.

The cable conduit can be mounted at an angle through the penetration at any angle between 90° and 45° to the wall or the floor.

/ For fire resistance class and installation details, see tables:

Table	Type of penetration	Figure	Fire resistance class	Page
1	Rigid floor ≥ 150 mm. Plastic cable conduit, KL-reserve Ø32, Ø50 in multiple penetrations.	1	E 180 / EI 180	**57**
2	Rigid floor ≥ 150 mm. Steel cable conduit Ø32, Ø52, Ø76, 65x65 and 95x95 x 250 mm in multiple penetrations.	2-3	E 120 / EI 120	**58**
3	Rigid wall ≥ 100 mm. Steel cable conduit Ø32, Ø52 and Ø76 mm in multiple penetrations.	4	E 120 / EI 60	**59**
4	Rigid wall ≥ 100 mm. Steel cable conduit 65x65 and 95x95 x 250 mm in multiple penetrations.	5	E 120 / EI 45	**59**
5	Flexible and Rigid wall ≥ 100 mm. Steel cable conduit Ø32, Ø52 and Ø76 mm in multiple penetrations.	6	E 120 / EI 120	**60**
6	Flexible and Rigid wall ≥ 100 mm. Steel cable conduit 65x65 and 95x95 x 250 mm in multiple penetrations.	7	E 120 / EI 90	**60**
7	Flexible and Rigid wall ≥ 100 mm. Single steel cable conduit Ø32, Ø52 and Ø76 mm.	8-11	E 120 / EI 90	**61**
8	Flexible and Rigid wall ≥ 100 mm. Single steel cable conduit 65x65 and 95x95 x 250 mm.	12-13	E 120 / EI 60	**62**
9-10	Flexible and Rigid wall ≥ 130 mm. Plastic cable conduit, KL-reserve Ø32, Ø50 in multiple penetrations.	14	E 240 / ≤ EI 240	**63**
11	Flexible and Rigid wall ≥ 130 mm. Steel cable conduit 65x65 and 95x95 x 150, 65x65 and 95x95 x 400 mm in multiple penetrations.	15	E 240 / EI 120	**64**

Rigid floor ≥ 150 mm

Table: 1

Fire resistance class E180 / EI 180		
Rigid floor ≥ 150 mm. Multiple penetrations 230 x 442 mm		
KL - reserve (PVC cable conduit) (d)	**Thickness of GPG flush with the top of the floor (mm)**	**Figure**
Ø 32 mm	GPG 130	**1**
Ø 50 mm		

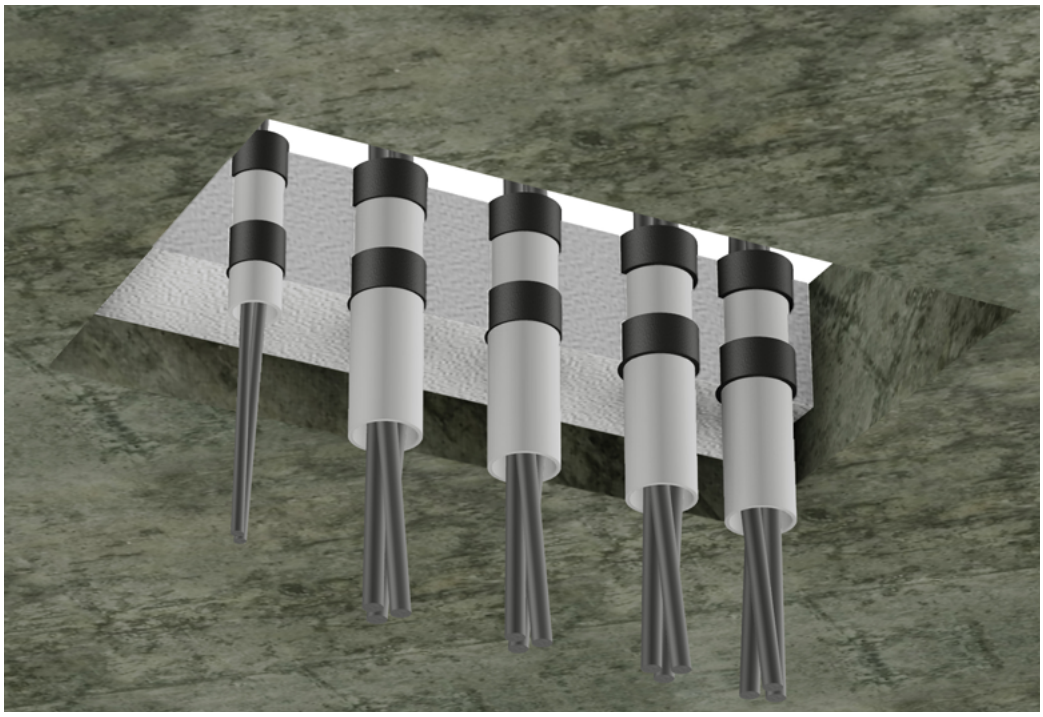
Installation

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG sealant is applied with 130 mm thickness flush with the top of the floor.

The distance from the edge of the aperture to the conduit and the distance between the cable conduits should be minimum 20 mm.

The KL-reserve insulation in the seal must fit tightly. So that the heat expanding laminate outside of the KL-reserve is applied exactly flush with fire sealing on both sides of the floor. KL-reserve must be visible in the seal by complete fire sealing.

Figure 1.



Note:

- Before installing cable in KL-reserve, make a hole in a 30 mm thick smoke seal inside the cable conduit. This is easily done with a drill for wood or steel. This drilled hole in the smoke seal should be maximum 2 mm larger than the cable diameter. Then pull the cable through the cable conduit.
- KL - reserve can also be used as a single cable conduit assuming that the same depth of FIRESAFE GPG MORTAR sealant is used around the conduit as described in the tables for multiple penetration.
- FIRESAFE cable conduit KL- reserve can be mounted at an angle through the penetration at any angle between 90° and 45° to the wall or the floor.
- KL-reserve is available in different lengths: 130 - 150 - 200 - 300 mm, that are adapted to different thicknesses of walls or floors. A cable conduit, that is longer than the thickness of the wall or floor, may also be used. As long as the heat expanding laminate outside of the KL-reserve is installed exactly flush with the fire sealing on both sides of the wall or floor. It is possible because the heat expanding laminate outside the KL-reserve is movable at one of the ends.

Rigid floor ≥ 150 mm

Table: 2

Fire resistance class E 120 / EI 120			
Rigid floor ≥ 150 mm			
Cable conduit type (d)	**Thickness of GPG flush with the top of the floor (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Ø 32 mm	GPG 100	Stone wool 100kg/m3, 50	**2**
Ø 52 mm			
Ø 76 mm			
65 x 65 x 250 mm		Stone wool 100kg/m3, 50	**3**
95 x 95 x 250 mm			

Installation

The aperture is insulated with 50 mm stone wool, density 100 kg/m3. The stone wool insulation must fit tightly.

Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly. Make a hole in the insulation with a knife adapted to the size and number of cable conduits.

The distance from the edge of the aperture to the conduit and the distance between the cable conduits should be minimum 20 mm.

GPG mortar is mixed to a fluid consistency with 2 parts GPG and 1 part water. Alternatively GPG can be mixed to a firm consistency using 4 parts GPG and 1 part water. GPG sealant is applied flush with the top of the floor.

Figure 2. Thickness of GPG 100 mm

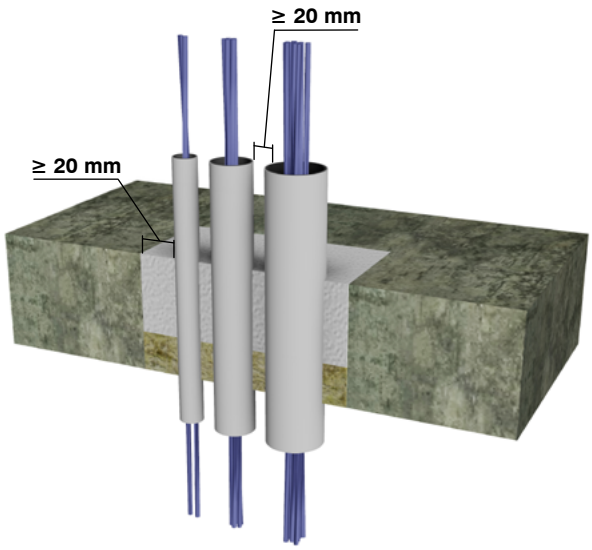
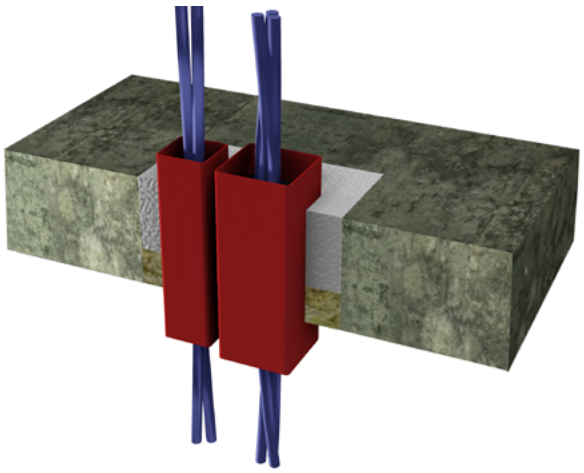


Figure 3. Thickness of GPG 100 mm



Rigid wall ≥ 100 mm

Table: 3

Fire resistance class E 120 / EI 60			
Rigid wall ≥ 100 mm			
Cable conduit type (d)	**Thickness of GPG flush with the wall (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Ø 32 mm	GPG 50	Stone wool 150kg/m3, 50	**4**
Ø 52 mm			
Ø 76 mm			

Table: 4

Fire resistance class E 120 / EI 45			
Rigid wall ≥ 100 mm			
Cable conduit type (d)	**Thickness of GPG flush with the wall (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
65 x 65 x 250 mm	GPG 50	Stone wool 150kg/m3, 50	**5**
95 x 95 x 250 mm			

Installation

The aperture is insulated with 50 mm stone wool, density 150 kg/m3. The insulation must fit tightly into the aperture.

Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly. Make a hole in the insulation with a knife adapted to the size and number of cable conduits.

The distance from the edge of the aperture to the conduit and the distance between the cable conduits should be minimum 20 mm

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG sealant is applied flush with the wall.

Figure 4. Thickness of GPG 50 mm

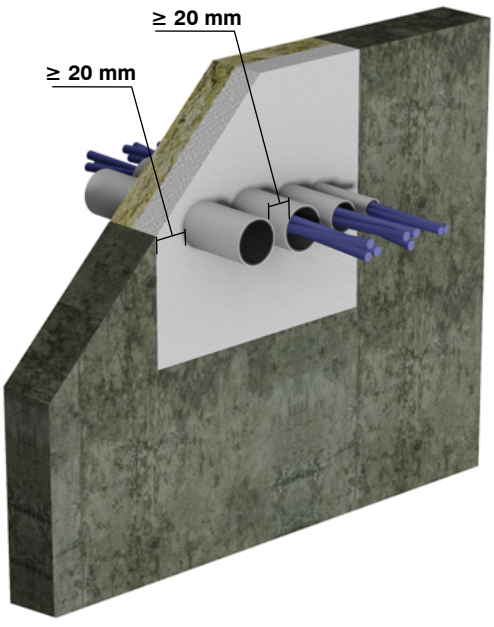
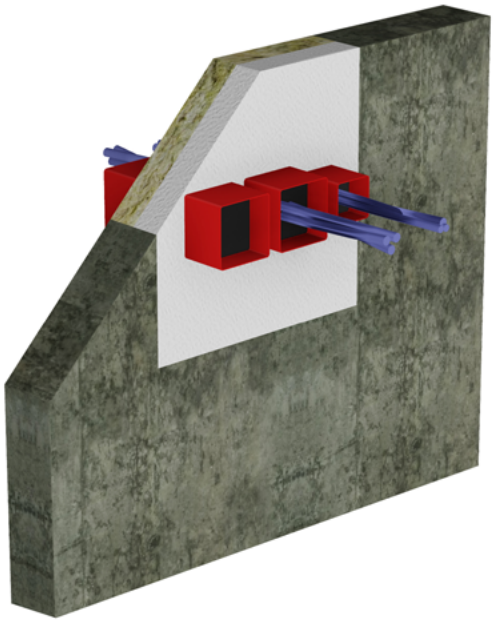


Figure 5. Thickness of GPG 50 mm



Flexible and Rigid wall ≥ 100 mm

Table: 5

Fire resistance class E 120 / EI 120			
Flexible and Rigid wall ≥ 100 mm			
Cable conduit type (d)	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Ø 32 mm	GPG 40	Stone wool 150kg/m3, 20	**6**
Ø 52 mm			
Ø 76 mm			

Table: 6

Fire resistance class E 120 / EI 90			
Flexible and Rigid wall ≥ 100 mm			
Cable conduit type (d)	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
65 x 65 x 250 mm	GPG 40	Stone wool 150kg/m3, 20	**7**
95 x 95 x 250 mm			

Installation

The aperture is insulated with 20 mm stone wool, density 150 kg/m3. The insulation must fit tightly into the aperture.

Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly. Make a hole in the insulation with a knife adapted to the size and number of cable conduits.

The distance from the edge of the aperture to the conduit and the distance between the cable conduits should be minimum 20 mm.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG sealant is applied flush with the wall on both sides.

Figure 6. Thickness of GPG 2x40 mm

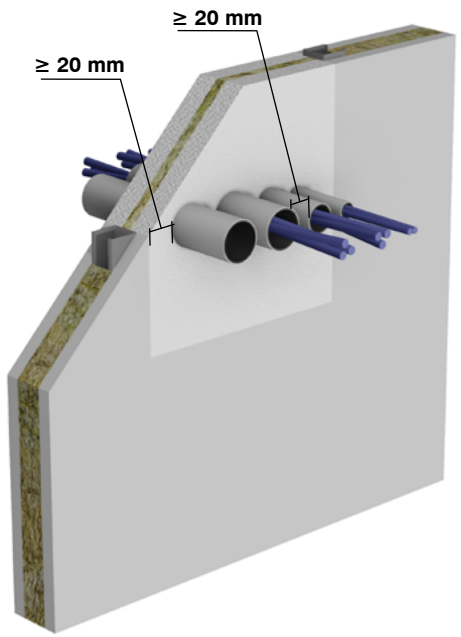
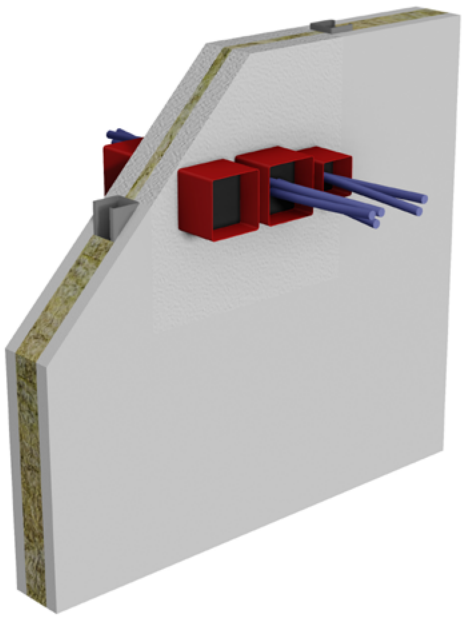


Figure 7. Thickness of GPG 2x40 mm



Flexible and Rigid wall ≥ 100 mm

Table: 7

Fire resistance class E 120 / EI 90			
Flexible and Rigid wall ≥ 100 mm			
Cable conduit type (d)	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Ø 76 mm	GPG 30	Stone wool 60kg/m3, 40	**8**
Ø 52 mm	GPG 30	Stone wool 60kg/m3, 40	**9**
Ø 32 mm	GPG 30	Stone wool 60kg/m3, 40	**10**
Ø 76 mm	GPG 30	Stone wool 60kg/m3, 40	**11**

Installation

The aperture is filled in around the single cable conduit with a minimum thickness of 40 mm of stone wool, density 60kg/m3.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG is applied at a thickness of 30 mm, flush with the wall from both sides.

Figure 8. Thickness of GPG 2x30 mm

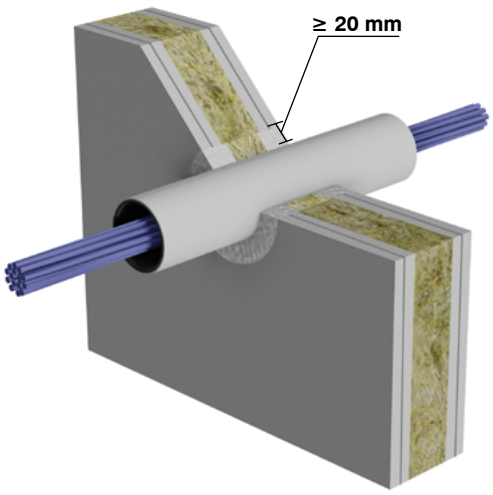


Figure 9. Thickness of GPG 2x30 mm

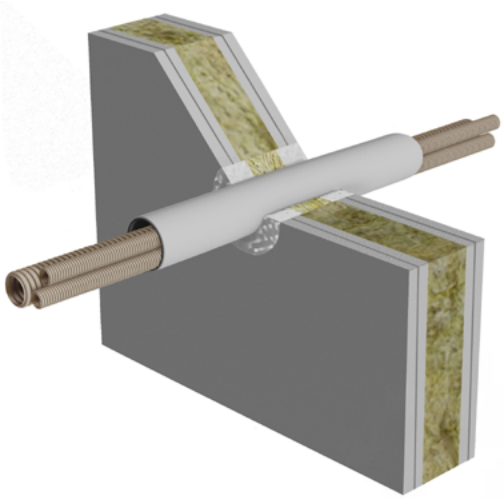


Figure 10. Thickness of GPG 2x30 mm

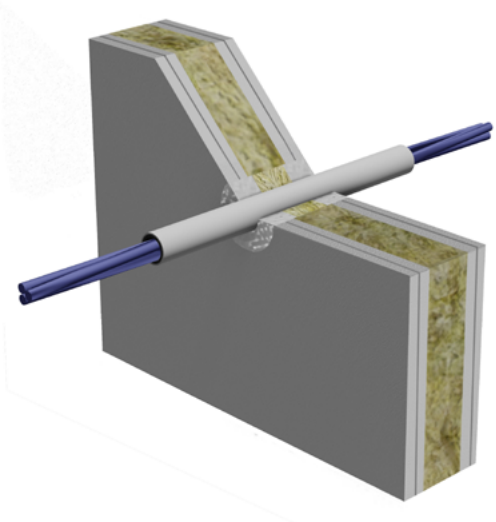
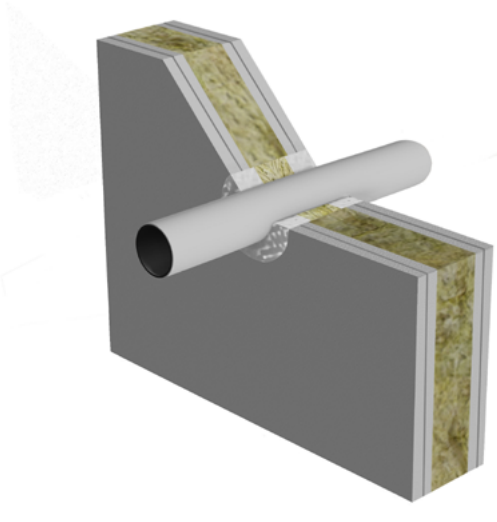


Figure 11. Thickness of GPG 2x30 mm



Flexible and Rigid wall ≥ 100 mm

Table: 8

Fire resistance class E 120 / EI 60			
Flexible and Rigid wall ≥ 100 mm			
Cable conduit type (d)	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
65 x 65 x 250 mm	GPG 30	Stone wool 60kg/m3, 40	**12**
95 x 95 x 250 mm	GPG 30	Stone wool 60kg/m3, 40	**13**

Installation

The aperture is filled in around the single cable conduit with a minimum thickness of 40 mm of stone wool, density 60kg/m3. GPG compound is mixed to a firm consistency with 4 parts GPG and 1 part water. It is applied in a thickness of 30 mm in flush with the wall on both sides.

Figure 12. Thickness of GPG 2x30 mm

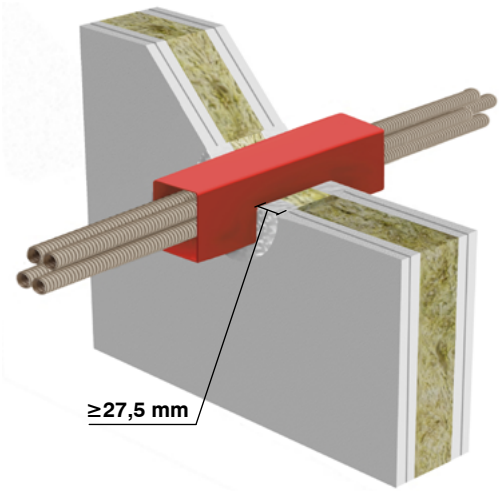
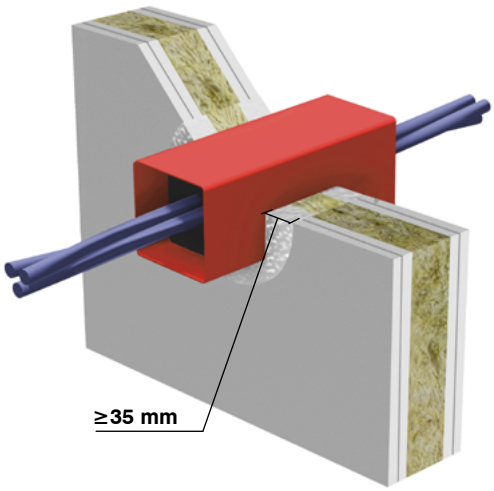


Figure 13. Thickness of GPG 2x30 mm



Flexible and Rigid wall ≥ 130 mm

Table: 9

Fire resistance class E 240 / EI 240			
Flexible and Rigid wall ≥ 130 mm. Multiple penetrations 1000 x 800 mm			
KL - reserve (PVC cable conduit) (d)	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
Ø 32 mm	GPG 40	Stone wool 150kg/m3, 50	**14**

Tabell: 10

Fire resistance class E 240 / EI 120			
Ø 50 mm	GPG 40	Stone wool 150kg/m3, 50	**14**

Installation

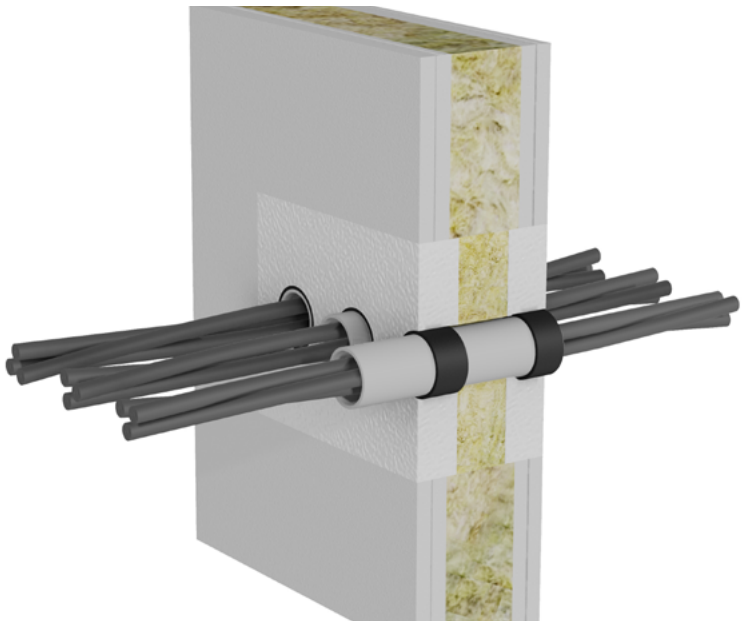
The aperture is insulated with 50 mm stone wool, density 150 kg/m3. The stone wool insulation must fit tightly.

Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly. Make a hole in the insulation with a knife adapted to the size and number of cable conduits.

The distance from the edge of the aperture to the conduit and the distance between the cable conduits should be minimum 20 mm.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG sealant is applied to a thickness of 40 mm flush with the wall on both sides.

Figure 14. Thickness of GPG 2x40 mm



Note:

- Before installing cable in KL-reserve, make a hole in a 30 mm thick smoke seal inside the cable conduit. This is easily done with a drill for wood or steel. This drilled hole in the smoke seal should be maximum 2 mm larger than the cable diameter. Then pull the cable through the cable conduit.
- KL - reserve can also be used as a single cable conduit assuming that the same depth of FIRESAFE GPG MORTAR sealant is used around the conduit as described in the tables for multiple penetration.
- FIRESAFE cable conduit KL- reserve can be mounted at an angle through the penetration at any angle between 90° and 45° to the wall or the floor.
- KL-reserve is available in different lengths: 130 - 150 - 200 - 300 mm, that are adapted to different thicknesses of walls or floors. A cable conduit, that is longer than the thickness of the wall or floor, may also be used. As long as the heat expanding laminate outside of the KL-reserve is installed exactly flush with the fire sealing on both sides of the wall or floor. It is possible because the heat expanding laminate outside the KL-reserve is movable at one of the ends.

Flexible and Rigid wall ≥ 130 mm

Table: 11

Fire resistance class E 240 / EI 120			
Flexible and Rigid wall ≥ 130 mm. Multiple penetrations 1000 x 800 mm			
Cable conduit type (d)	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
65 x 65 x 150 mm	GPG 40	Stone wool 150kg/m3, 50	**15**
95 x 95 x 150 mm	GPG 40	Stone wool 150kg/m3, 50	
65 x 65 x 400 mm	GPG 40	Stone wool 150kg/m3, 50	
95 x 95 x 400 mm	GPG 40	Stone wool 150kg/m3, 50	

Installation

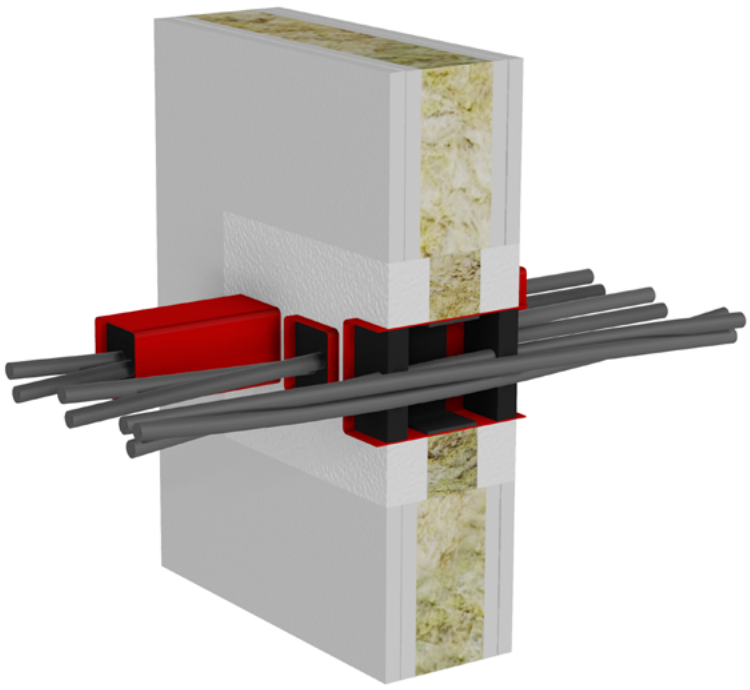
The aperture is insulated with 50 mm stone wool, density 150 kg/m3. The stone wool insulation must fit tightly.

Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly. Make a hole in the insulation with a knife adapted to the size and number of cable conduits.

The distance from the edge of the aperture to the conduit and the distance between the cable conduits should be minimum 20 mm.

GPG mortar is mixed to a firm consistency with 4 parts GPG and 1 part water. GPG sealant is applied to a thickness of 40 mm flush with the wall on both sides.

Figure 15. Thickness of GPG 2x40 mm



Note:

- FIRESAFE square cable conduit can also be used as a single cable conduit in wall assuming that the same depth of FIRESAFE GPG MORTAR sealant is used around the conduit as described in the tables for multiple penetration.
- FIRESAFE square cable conduit can be mounted at an angle through the penetration at any angle between 90° and 45° to the wall or the floor.

Floor drains

/ For fire resistance class and installation details, see tables:

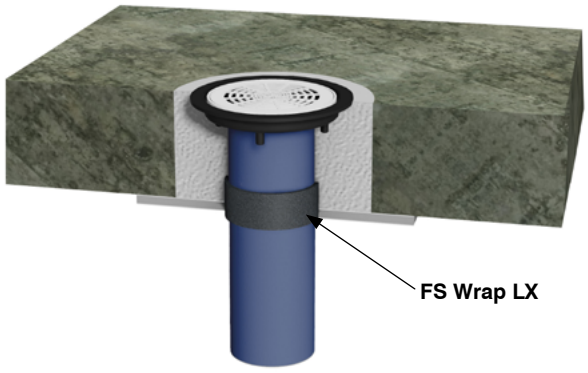
Table	Type of drain	Figure	Fire resistance class	Page
1	P: Pipelife PILI (plastic PP) Ø 215 mm	1	E 120 / EI 120	**65**
1	K: PURUS Joti K (plastic PP) Ø 215 mm	2	E 120 / EI 120	**66**
1	K: PURUS Joti K (plastic PP) Ø 215 mm	3	E 120 / EI 120	**66**
2	KS: PURUS Joti KS (cast iron) Ø 215 mm	4	E 90 / EI 90	**67**
2	KR: PURUS Joti KR (stainless steel) Ø 190 mm	5	E 90 / EI 90	**67**
2	KR: PURUS Joti KR (stainless steel) Ø 190 mm	6	E 90 / EI 90	**67**
3	R: PURUS Joti Balder R (stainless steel) Ø 200 mm	7	E 120 /EI 60	**68**
3	RN: PURUS Joti Balder B 75 R Nood (stainless steel) Ø 200 mm	8	E 120 / EI 60	**68**
4	KR: PURUS Joti KR (stainless steel) Ø 190 mm	9	E 60 / EI 60	**69**
4	KS: PURUS Joti KS (cast iron) Ø 215 mm	10	E 60 / EI 60	**69**

Table: 1

Fire resistance class E 120 / EI 120						
Rigid floor ≥ 150 mm. Aperture for drain Ø 270 mm						
Type of drain	**Drain pipe: type, diameter, wall thickness (mm)**	**Concrete layer on top of the floor (mm)**	**Covering on the underside of the floor (mm)**	**Thickness of GPG (mm)**	**Other additional products (mm)**	**Figure**
P	Plastic pipes, Ø110, 2,6		Plasterboard 12,5	GPG 150	FS Wrap LX 2 x 2,5	**1**
K	Plastic pipes, Ø75, 2,6		Plasterboard 12,5	GPG 150	FS Fire Collar Ø 90 x 30	**2**
K	Plastic pipes, Ø75, 2,3	Concrete 25	Plasterboard 12,5	GPG 150	FS Wrap LX 2 x 2,5	**3**

Installation

Figure 1. Pipelife PILI (plastic PP) Ø 215 mm. Plastic drain pipe PP Ø110



The underside of the floor is covered with a standard 12,5 mm plasterboard before installing the drain.

A drill or saw is used to make a hole in the plasterboard with a diameter of about Ø 120 for the drain, drain pipes and FS Wrap LX.

After the drain pipe is run through the plasterboard, FS Wrap LX is installed with two tight wraps around the pipe. Push the FS Wrap LX into the plasterboard so that the FS Wrap LX becomes flush with the lower edge of the plasterboard/ floor.

After the FS Wrap LX is installed, the drain is installed on the drain pipe.

Finally, GPG is mixed to a fluid consistency with 2 parts GPG and 1 part water.

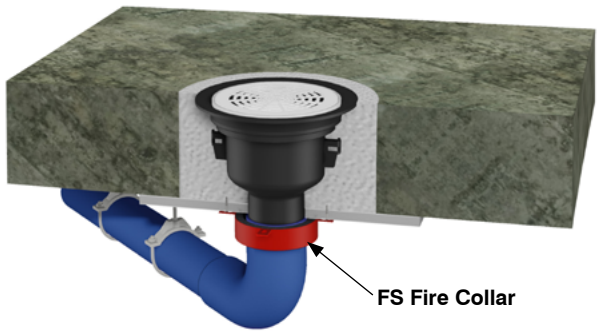
The entire aperture around the drain is filled with GPG in a thickness of 150 mm.

The plasterboard cover should not be removed.

Floor drains

Installation

Figure 2. PURUS Joti K (plastic PP) Ø 215 mm. Plastic drain pipe PP Ø 75, with connecting sleeve



The underside of the floor is covered with a standard 12,5 mm plasterboard before installing the drain.

A drill or saw is used to make a hole in the plasterboard with a diameter of about Ø 76 mm for the drain – drain pipes.

When the drain has been run through the plasterboard, mix GPG to a fluid consistency with 2 parts GPG and 1 part water.

The entire aperture around the drain is filled with GPG in a thickness of 150 mm.

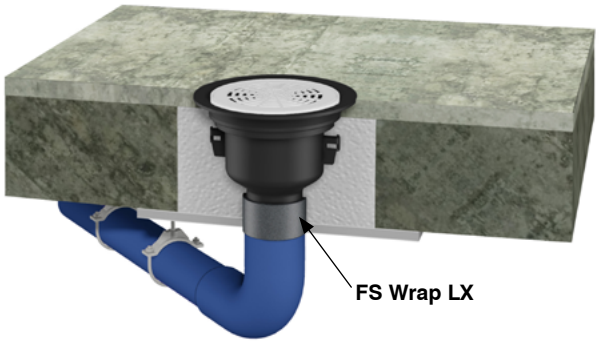
A drain pipe of PP plastic, with connecting sleeve is mounted on the drain outlet.

Finally, install the FS Fire Collar Ø 90mm around the drainpipe and connecting sleeve. The FS Fire Collar attaches to the plasterboard and GPG sealant with 40–50mm long wood screws that are screwed into the GPG mortar.

The plasterboard cover must not be removed.

Installation

Figure 3. PURUS Joti K (plastic PP) Ø 215 mm. Plastic drain pipe PP Ø75, with connecting sleeve



The underside of the floor is covered with a standard 12,5 mm plasterboard before installing the drain.

A drill or saw is used to make a hole in the plasterboard with an exact diameter of about Ø 90 mm for the drain pipe with connecting sleeve and FS Wrap LX.

After the drain pipes are run through the plasterboard, FS Wrap LX is installed with two wraps tightly around the pipe. Push the FS Wrap LX into the hole in the plasterboard so that it is flush with the lower edge plasterboard/floor.

Finally, GPG is mixed to a fluid consistency with 2 parts GPG and 1 part water.

The entire aperture around the drain is filled with GPG in a thickness of 150 mm. Ordinary cement mortar with a minimum of 25 mm is applied to the top of the floor above the GPG seal.

The plasterboard cover must not be removed.

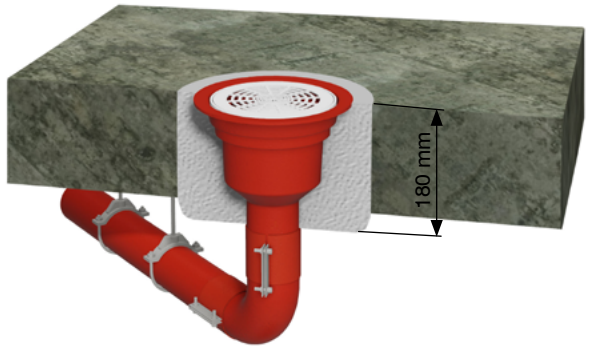
Floor drains

Table: 2

Fire resistance class E 90 / EI 90					
Rigid floor ≥ 150 mm. Aperture for drain Ø 270 mm					
Type of drain	**Drain pipe: type, diameter (mm)**	**Concrete layer on top of the floor (mm)**	**Covering on the underside of the floor (mm)**	**Thickness of GPG (mm) flush with the top of the slab**	**Figure**
KS	Cast iron, Ø75			GPG 180	**4**
KR	Cast iron, Ø75			GPG 200	**5**
KR	Cast iron, Ø75	Concrete 25	Plasterboard 12,5	GPG 150	**6**

Installation

Figure 4. PURUS Joti KS (cast iron) Ø 215 mm. Cast iron drain pipe Ø75 mm



For Fire resistance class EI 90 GPG must be at least 180 mm thick.

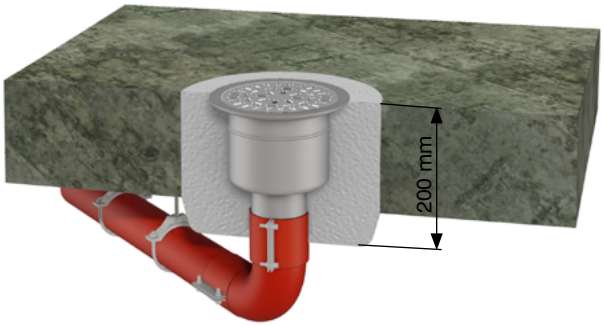
For thin rigid floor structures, GPG must be applied under the floor so that the total GPG thickness is 180mm, this is done with firm GPG mortar.

Floor greater than or equal to 180 mm are covered on the underside with standard plasterboard or backing of stone wool in the aperture.

The fire sealant is normally applied from above with GPG in fluid consistency mixed with 2 parts GPG and 1 part water, but may also be applied from below with GPG mixed to a firm consistency with 4 parts GPG and 1 part water.

Installation

Figure 5. PURUS Joti KR (stainless steel) Ø 190 mm. Cast iron drain pipe Ø75 mm



For Fire resistance class EI 90 GPG must be at least 200 mm thick.

For thin rigid floor structures, GPG must be applied under the floor so that the total GPG thickness is 200mm, this is done with firm GPG mortar.

Floor greater than or equal to 200 mm are covered on the underside with standard plasterboard or backing of stone wool in the aperture.

The fire sealant is normally applied from above with GPG in fluid consistency mixed with 2 parts GPG and 1 part water, but may also be applied from below with GPG mixed to a firm consistency with 4 parts GPG and 1 part water.

Installation

Figure 6. PURUS Joti KR (rustfritt stål) Ø 190 mm. Cast iron drain pipe Ø75 mm

The underside of the slab is covered with a standard 12,5 mm plasterboard before installing the drain.

A drill or saw is used to make a hole in the plasterboard with a diameter of about Ø 76 mm for the drain.

When drain has been run through the plasterboard and the drain pipe is mounted, mix GPG to a fluid consistency with 2 parts GPG and 1 part water.

The entire aperture around the drain is filled with GPG in a thickness of 150 mm.

Ordinary cement mortar with a minimum of 25 mm is applied to the top of the floor above the GPG seal.

The plasterboard cover must not be removed.

Floor drains

Table: 3

Fire resistance class E 120 / EI 60					
Rigid floor ≥ 150 mm. Aperture for drain Ø 270 mm					
Type of drain	**Drain pipe: type, diameter (mm)**	**Concrete layer on top of the floor (mm)**	**Covering on the underside of the floor (mm)**	**Thickness of GPG (mm)**	**Figure**
R	Cast iron Ø75	Concrete 25	Plasterboard 12,5	GPG 150	**7**
RN	Cast iron Ø75	Concrete 25	Plasterboard 12,5	GPG 150	**8**

Installation

Figure 7. PURUS Joti Balder R (stainless steel) Ø 200 mm. Cast iron drain pipe Ø75 mm

The underside of the floor is covered with a standard 12,5 mm plasterboard before installing the drain.

A drill or saw is used to make a hole in the plasterboard with a diameter of about Ø 76 mm for the drain – drain pipes.

When drain has been run through the plasterboard and the drain pipe is mounted, mix GPG to a fluid consistency with 2 parts GPG and 1 part water.

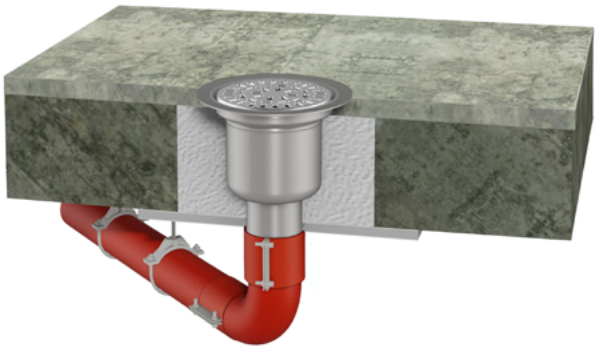
The entire aperture around the drain is filled with GPG in a thickness of 150 mm.

Ordinary cement mortar with a minimum thickness of 25 mm is applied to the top of the floor above the GPG seal.

The plasterboard cover must not be removed.

Installation

Figure 8. PURUS Joti Balder B 75 R Nood (stainless steel) Ø 200 mm. Cast iron drain pipe Ø75 mm



The underside of the floor is covered with a standard 12,5 mm plasterboard before installing the drain.

A drill or saw is used to make a hole in the plasterboard with a diameter of about Ø 76 mm for the drain – drain pipes.

When drain has been run through the plasterboard and the drain pipe is mounted, mix GPG to a fluid consistency with 2 parts GPG and 1 part water.

The entire aperture around the drain is filled with GPG in a thickness of 150 mm.

Ordinary cement mortar with a minimum thickness of 25 mm is applied to the top of the floor above the GPG seal.

The plasterboard cover must not be removed.

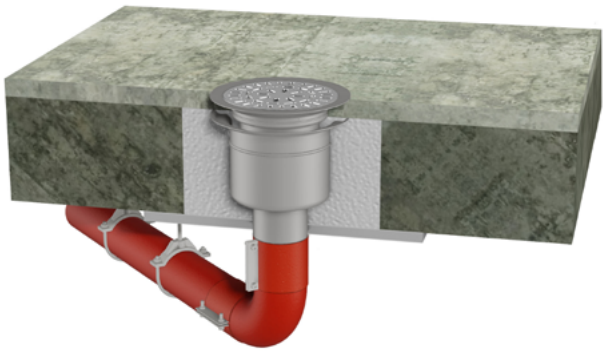
Floor drains

Table: 4

Fire resistance class E 60 / EI 60						
Rigid floor ≥ 150 mm. Aperture for drain Ø 270 mm						
Type of drain	**Drain pipe: type, diameter (mm)**	**Concrete layer on top of the floor (mm)**	**Covering on the underside of the floor (mm)**	**Thickness of GPG (mm)**	**Additional protection**	**Figure**
KR	Cast iron Ø75	Concrete 25	Plasterboard 12,5	GPG 150	Elevation ring	**9**
KS	Cast iron Ø75	Concrete 25	Plasterboard 12,5	GPG 150		**10**

Installation

Figure 9. PURUS Joti KR (stainless steel) Ø 190 mm. Cast iron drain pipe Ø75 mm



The underside of the floor is covered with a standard 12,5 mm plasterboard before installing the drain.

A drill or saw is used to make a hole in the plasterboard with a diameter of about Ø 76 mm for the drain – drain pipes.

When drain has been run through the plasterboard and the drain pipe is mounted, mix GPG to a fluid consistency with 2 parts GPG and 1 part water.

The entire aperture around the drain is filled with GPG in a thickness of 150 mm.

Ordinary cement mortar with a minimum thickness of 25 mm is applied to the top of the floor above the GPG seal.

The plasterboard cover must not be removed.

Installation

Figure 10. PURUS Joti KS (cast iron) Ø 215 mm. Cast iron drain pipe Ø75mm

The underside of the floor is covered with a standard 12,5 mm plasterboard before installing the drain.

A drill or saw is used to make a hole in the plasterboard with a diameter of about Ø 76 mm for the drain – drain pipes.

When drain has been run through the plasterboard and the drain pipe is mounted, mix GPG to a fluid consistency with 2 parts GPG and 1 part water.

The entire aperture around the drain is filled with GPG in a thickness of 150 mm.

Ordinary cement mortar with a minimum thickness of 25 mm is applied to the top of the floor above the GPG seal.

The plasterboard cover must not be removed.

Empty apertures, horizontal joints

Large apertures: The maximum size aperture tested in the test furnace with or without penetration is 900x1800 mm in floors and 1200x 1200 mm in walls.

All tested apertures with penetration can be used as empty apertures. Sealant thickness of GPG must be as in the tables for installation penetrations.

Large apertures in floor slabs easily accessible to the general public, and where there may be pedestrian traffic, must also be reinforced with 12 mm rebar c/c 300. Joint reinforcement must be drilled 300 mm in from the edge of the floor and 300 mm out to the aperture. In addition, it should be reinforced with K335 mesh. Ø 6 mm with squares of 150x150 mm. The reinforcement mesh must be cut and sized.The reinforcement mesh is tied to the rebar with 2 mm steel wire about 35 mm from the edge of the floor.

Install 50 mm of stone wool insulation with a density of 150kg/ m3 under the rebar and reinforcement mesh. Finally, the entire aperture is fireproofed with GPG 100 mm thick. Fire resistance class E 120/ EI 120.

Smaller apertures where there is no pedestrian traffic are fireproofed according to the tables below.

Additional reinforcement does not apply to apertures in walls.

/ **For fire resistance class and installation details, see tables:**

Table	Type of seal	Figure	Fire resistance class	Page
1	Rigid floor ≥ 150 mm. Single-sided seal in empty aperture 600x600mm.	1	E 120 / EI 120	**72**
2 - 3	Rigid wall ≥ 100 mm. Single-sided seal in empty aperture 400x400 mm.	2	≤ E 120 / ≤ EI 60	**73**
4 - 5	Flexible and Rigid wall ≥ 100 mm. Double-sided seal in empty aperture 400x400 mm.	3	≤ E 120 / ≤ EI 120	**74**
6 -7	Rigid wall ≥ 100 mm. Flexible and Rigid wall ≥ 100 mm. Single- and double-sided horizontal joint seal 5-75 mm.	4-5	E 120 / ≤ EI 120	**75**

Rigid floor ≥ 150 mm

Table: 1

Fire resistance class E 120 / EI 120			
Rigid floor ≥ 150 mm			
Largest aperture dimension (mm)	**Thickness of GPG**	**Backing, type, density, thickness (mm)**	**Figure**
600 x 600 mm	GPG 30	Stone wool 150kg/m3,50	**1**
600 x 600 mm	GPG 50	Stone wool 150kg/m3, 20	
600 x 600 mm	GPG 80	Stone wool 150kg/m3, 20	

Installation

The aperture is insulated with the backing type, density and thickness as described in the tables above.

To ensure the insulation will stay in place when applying the fire sealant, the stone wool insulation must fit tightly into the aperture.

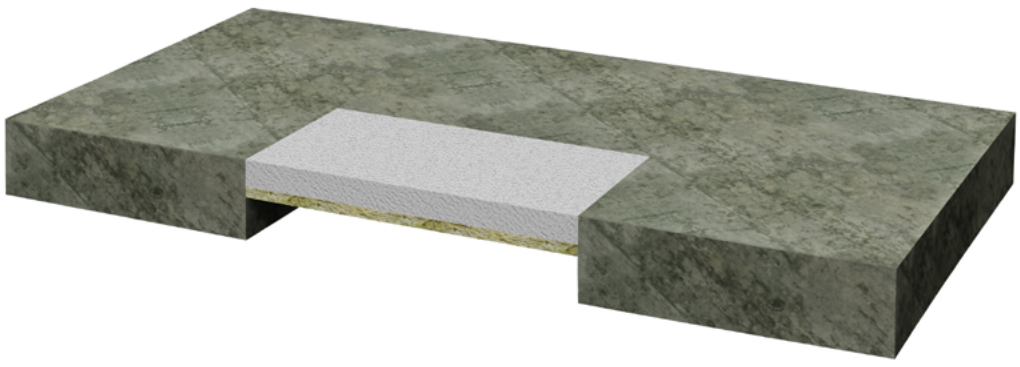
Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly.

Push the stone wool insulation into the aperture, then mix the GPG mortar to a fluid consistency with 2 parts GPG and 1 part water.

Alternatively GPG can be mixed to a firm consistency using 4 parts GPG and 1 part water.

GPG sealant is applied flush with the top of the floor.

Figure 1. Thickness of GPG 30 / 50 / 80 mm. Insulation of 50 / 20 / 20 mm stone wool



Rigid wall ≥ 100 mm

Table: 2

Fire resistance class E 120 / EI 60			
Rigid wall ≥ 100 mm			
Largest aperture dimension (mm)	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
400 x 400 mm	GPG 30	Stone wool 150kg/m3, 20	**2**

Table: 3

Fire resistance class E 60 / EI 30			
Rigid wall ≥ 100 mm			
Largest aperture dimension (mm)	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
400 x 400 mm	GPG 20	Stone wool 150kg/m3, 20	**2**

Installation

The aperture is insulated with the backing type, density and thickness as described in the tables above.

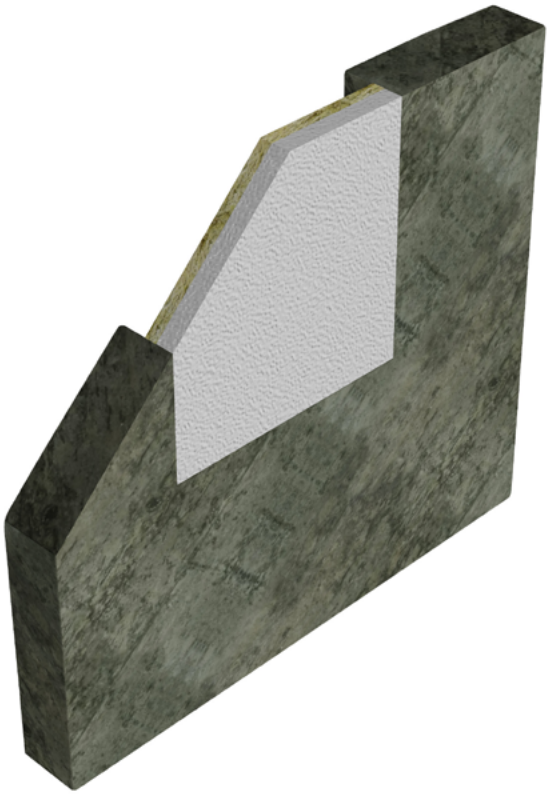
To ensure the insulation will stay in place when applying the fire sealant, the stone wool insulation must fit tightly into the aperture.

Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly.

Push the stone wool insulation into the aperture, then mix the GPG mortar to a firm consistency with 4 parts GPG and 1 part water.

GPG is applied flush with the wall on one side.

Figure 2. Thickness of GPG 20 / 30 mm



Flexible and Rigid wall ≥ 100 mm

Table: 4

Fire resistance class E 120 / EI 120			
Flexible and Rigid wall ≥ 100 mm			
Largest aperture dimension (mm)	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
400 x 400 mm	GPG 30	Stone wool 150kg/m3, 2 x 20	**3**
400 x 400 mm	GPG 20	Stone wool 150kg/m3, 2 x 20	
400 x 400 mm	GPG 15	Stone wool 150kg/m3, 2 x 20	

Table: 5

Fire resistance class E 90 / EI 90			
Flexible and Rigid wall ≥ 100 mm			
Largest aperture dimension (mm)	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
400 x 400 mm	GPG 10	Stone wool 150kg/m3, 2 x 20	**3**

Installation

The aperture is insulated with the backing type, density and thickness as described in the tables above.

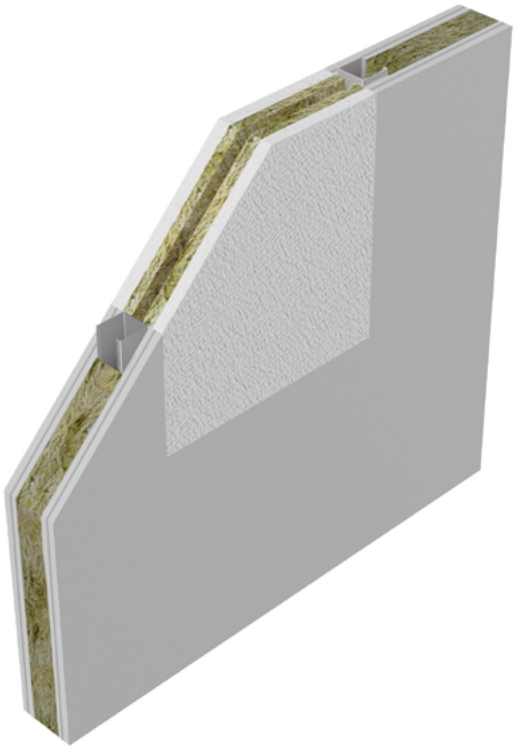
To ensure the insulation will stay in place when applying the fire sealant, the stone wool insulation must fit tightly into the aperture.

Cut the stone wool insulation leaving an excess of 2–3 mm so that it fits tightly.

Push the stone wool insulation into the aperture, then mix the GPG mortar to a firm consistency with 4 parts GPG and 1 part water.

GPG sealant is applied flush with the wall on both sides.

Figure 3. Thickness of GPG 10 / 15 / 20 / 30 mm from both sides



Flexible and Rigid wall ≥ 100 mm

Table: 6

Fire resistance class E 120 / EI 90			
Rigid wall ≥ 100 mm			
Joint width (mm)	**Thickness of GPG (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
5 – 75	GPG 30	Stone wool 60 kg/m3, 20	**4**

Table: 7

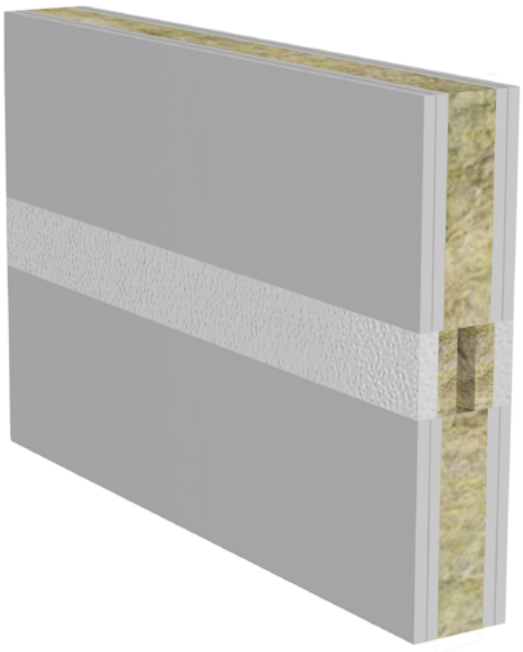
Fire resistance class E 120 / EI 120			
Flexible and Rigid wall ≥ 100 mm			
Joint width (mm)	**Thickness of GPG from both sides (mm)**	**Backing, type, density, thickness (mm)**	**Figure**
5 – 75	GPG 20	Stone wool 60 kg/m3, 2x20	**5**

Installation

Joint openings in rigid walls are filled with 20 mm of stone wool, density 60kg/m3 from one side.
Joint openings in flexible and rigid walls are filled with 20 mm of stone wool, density 60kg/m3 from one side.
Then, GPG is mixed to a firm consistency using 4 parts GPG and 1 part water.
The GPG joint is sealed flush with the wall on one or both sides.

Figure 4. Thickness of GPG 30 mm

Figure 5. Thickness of GPG 20 mm



FIRESAFE

Other documentation such as product data sheets, material safety data sheets (SDS) and performance statement (DoP) can be downloaded from ***www.firesafe.no.***

Product Certification with / off Performance Statement (DoP); For more information see the certification of CE-branded construction products through ETA on ***www.eota.eu****/.*

Always consult with www.firesafe.no for the latest version of assembly instructions, product data sheet and performance statement (DoP), as product development and testing are ongoing processes in FIRESAFE AS.

Contact FIRESAFE AS, Technical Department for other EI-requirements, non-standardized solutions or complex project-specific requirements; Email: ***firmapost@firesafe.no.***

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